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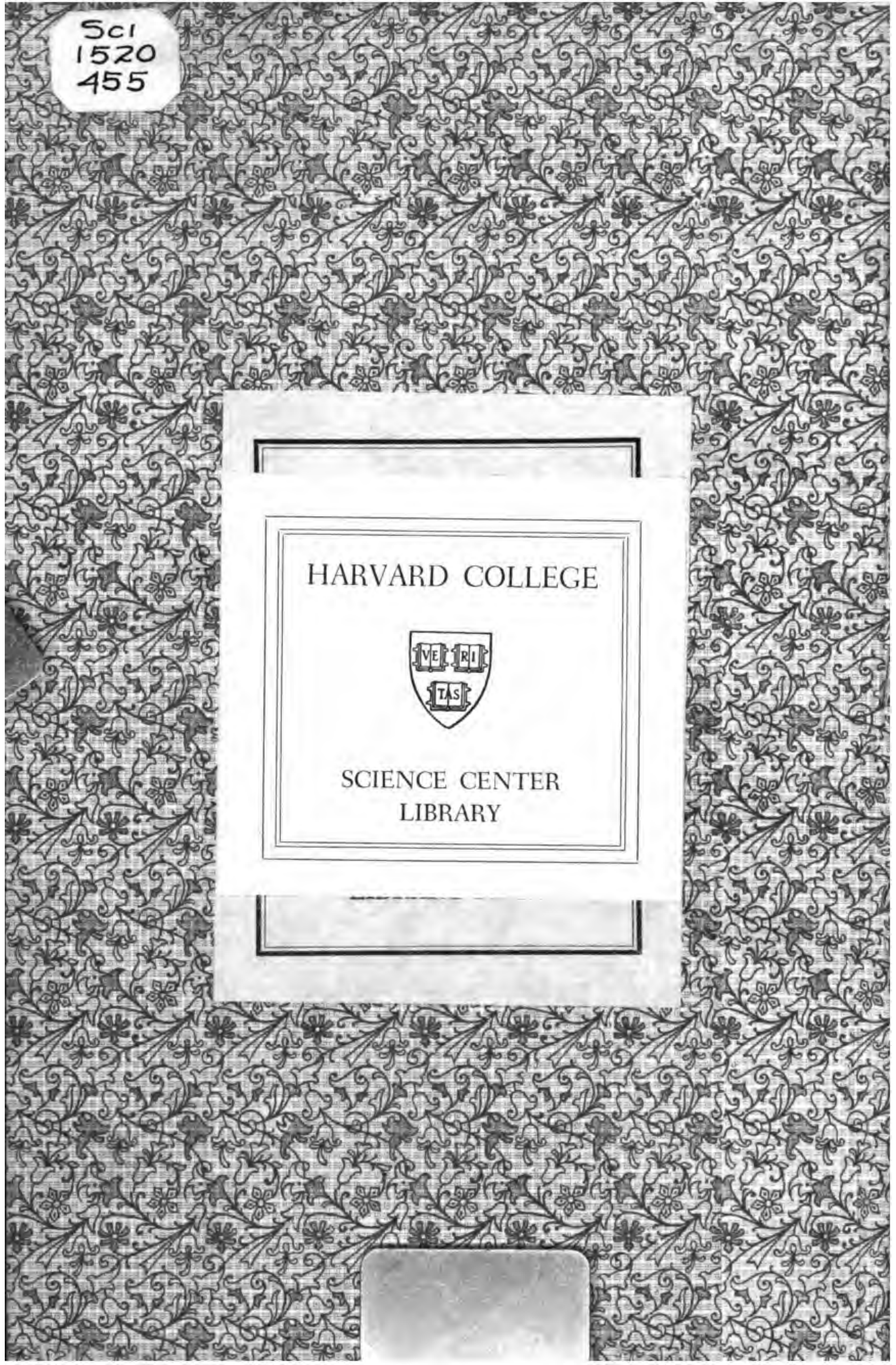

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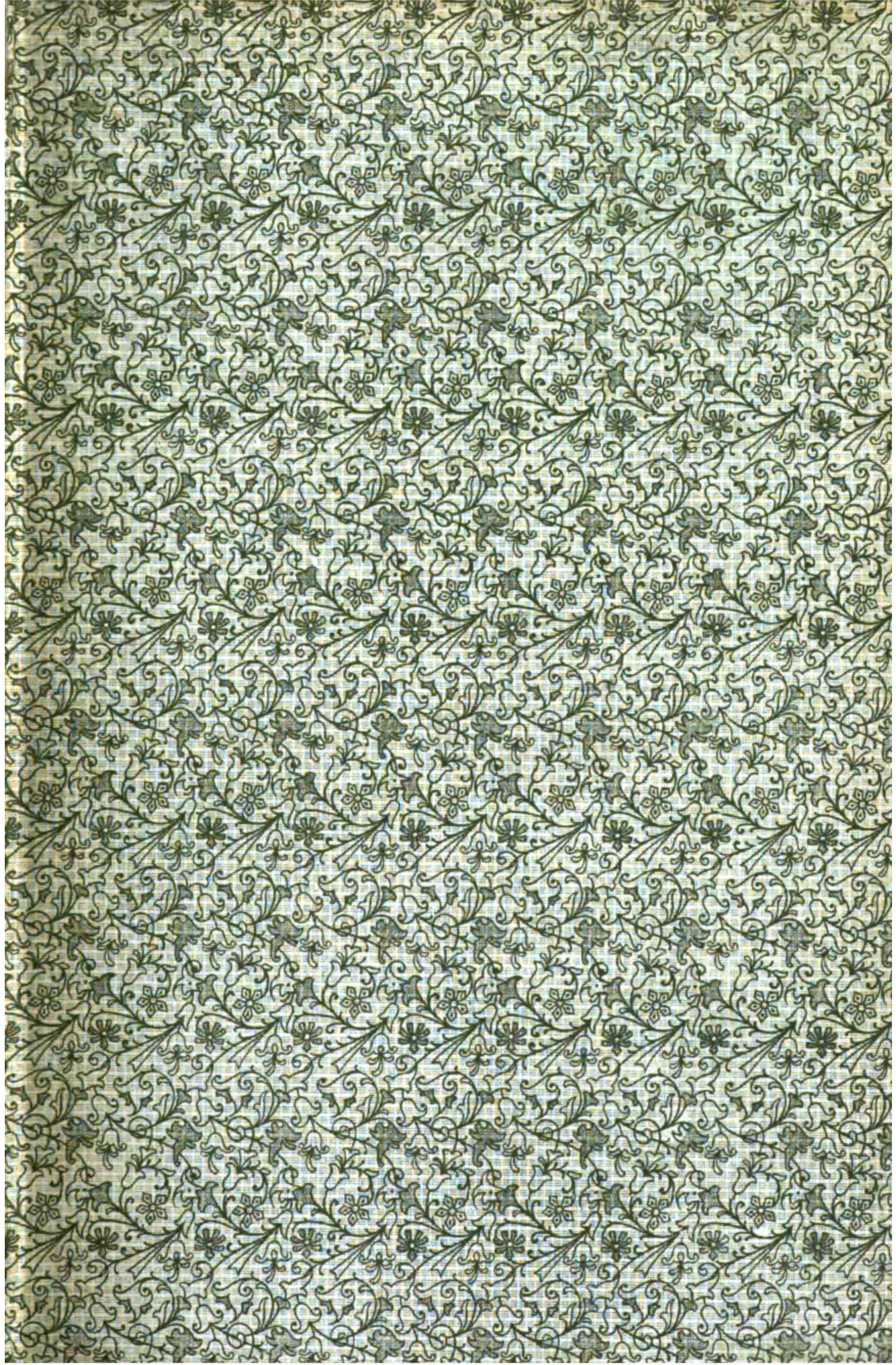

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National
Electric Light Association

THIRTY-EIGHTH CONVENTION

Commercial Sessions

Papers Reports and Discussions

SAN FRANCISCO CAL
JUNE 7-11 1915

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Bartlett, C W Paper *The Commercial Application of Resistance Furnaces* The commercial applications are divided into four classes, each having a definite temperature range, and typical operations are specified for each class.

The operation of the resistance type of furnace is described and details given in regard to the methods used to automatically hold the temperature constant. The article presents in detail the marked improvement which can be made in quality of product by the application of the electric resistance furnace in place of other types used for similar work and points out definitely the opportunities which electric furnaces offer as desirable new load builders.

Tabulated data are presented showing analyses of the atmosphere in the heating chambers and the amount of current consumed for specified outputs.

The paper is illustrated by means of charts, diagrams and halftone reproductions.

Discussed by Childs, DellPlain, Kearns, Learned, Loebell, Schneider. 375

Becker, J F *Report of the Commercial Section Finance Committee* 6

Burnett, Douglass *Address of Chairman* The work of the Section committees for the year is reviewed, in particular the efforts of the Committee on Wiring of Existing Buildings, looking toward the standardization of plugs and receptacles, and the results achieved by the Publications Committee in preparing, publishing and distributing nearly 1 000 000 pieces of printed matter to date. The continuance of the work of the Committee along present lines is recommended.

Friendly relations exist between the N. E. L. A. Commercial Section and other societies, and there has been active co-operation between the industrial power committee of the American Institute of Electrical Engineers and the Power Sales Bureau of the N. E. L. A. in the preparation of motor-application data in standard form. A friendly spirit of co-operation has also been manifested by the National Commercial Gas Association. 2

Edkins, E A *Report of the Publications Committee* A comparison of Commercial Section sales for three years, a booklet inventory and the financial statement to February of this year make an admirable showing of the Section activities.

The various "campaigns," their purpose and degree of success, are set forth, and the re-issue of *Industrial Lighting* with some necessary revision is announced. Too little attention has been paid to the proper lighting of factories and many factory owners are still "in the dark" on the subject of shop illumination.

The use of *Cushing's Manual* to get before members without loss of time the data collected since the last publication is explained and justified.

The report closes with a discussion of the question "Why are 82 per cent of our Class A members not buying the Section publications?"

Discussed by Baker, Boynton, Burnett, Gale, Gibbs, Jones, Learned, Lewis, Moseley, Osborn, Walton. 19

Hale, R S *Report of the Rate Research Committee* The first part of the report gives a brief review of the methods and principles by which member companies have in the past developed the broad outlines of their now existing rates, beginning with the street lighting rates, then following with store and house lighting rates, rates for power, wholesale rates, rates for ice making, heating, charging batteries, etc., showing how each rate has been developed so as to obtain the business of a new class of service that could not afford to take electricity at the old rates. In each case the new rate for the new class of business, although lower than the rates to the business already supplied, gave a profit over the increment costs which later led to a general reduction of all rates.

The Wright, Hopkinson and Doherty theories while extremely useful, have not given a complete solution of the problem.

Six general principles appear, consciously or unconsciously, to have been followed in obtaining the present rates. Briefly stated these are to the effect that rates should in no case go below bare cost or increment cost, while on the other hand if any section of the rates is placed so high that it discourages business the class that would otherwise be served pays nothing toward expenses, and, finally, between these limits the lowest rates to all are obtained by considering "value-of-service" while taking care that the total rates shall not give more than cost plus a fair profit on the whole investment.

The possibility that the rapid increase in efficiency of lamps may make a change in rates necessary is discussed. Attention is called to the various detail questions that are coming up from time to time before courts and commissions, and to the general soundness of the decisions of commissions on these various points, even when they have been asked to consider calculations based on theoretical costs that would give higher rates than those that would really develop the business. The Committee calls attention to its reports of past years, but has not considered it desirable this year to make any further changes in its proposed standard forms and wordings.

The financial condition of the publication, *Rate Research*, is given, with a recommendation that this be continued for the present, and the report concludes with the recommendation that as the principles of rate making appear to be well established, as far as the practice of the companies and the decisions of commissions are concerned, the Committee itself be either discontinued or continued merely for the purpose of publishing *Rate Research* and placing before the Association the various decisions and reports of commissions, with the idea that the Executive Committee can re-appoint or appoint a new committee should any special development warrant it.

Discussed by Almert, Freeman, Gilchrist, Hannon, Johnson, Kearns, Kennedy, Lloyd, Osborn, Pearson, Peck, Wagner, Williams. 338

Hale, R S *Report of Committee on Wiring of Existing Buildings* Part 1 deals with the standardization of plugs and receptacles and work that has been done, including various conferences with the manufacturers. In general, distinct progress has been made toward classification of plugs and receptacles. The Committee is continuing work with the idea of reducing the number of types in this class, until finally receptacles and plugs for use on lighting circuits shall be as standard as the present lamp socket and base.

Part 2 refers to the question of wiring, and reiterates the Committee's recommendation in favor of unit prices so as to enable central station solicitors to close contracts and yet let wiring contractors do the work.

As regards prevailing unit prices for wiring, compiled by Mr. H. E. Eisenmenger in Tables II and III, Table II shows such wiring prices as depend both upon the number of outlets and upon the kind of room in which they are placed. As these prices all include fixture prices they depend also upon the kind of fixtures used. Table III shows such wiring schedules as are based on unit prices per outlet, irrespective of the room in which they are placed. These prices are either excluding fixtures or including plain drop-cords. This table is subdivided according to geographical districts (see Fig 1) and to make comparison more easy the same information has been worked into graphical form (Figs 2 to 10).

Part 3 deals with the question of the wiring handbook. A very satisfactory arrangement has been made with the publishers of *Cushing's Standard Wiring* and this book has been revised to serve the purpose for the present.

Part 4 reports upon the standardization of screw threads for lamp bases, in regard to which the proposals of the Committee of the American Society of Mechanical Engineers have been accepted.

Part 5 covers the work on the National Electrical Code. Some changes were suggested, acting, however, through the Association insurance expert, Mr. Blood.

Part 6 discusses the question of bare concentric wire. A study of American and European conditions has led to the belief that there were numerous developments of safer and cheaper wiring on which in America we have not as yet obtained any practical experience, as there are rules still in the Code that were a necessity in the days when the neutral had to be insulated instead of being grounded as at present.

In order to get experience on at least one of these developments, steps were taken to have the so-called bare concentric wire considered by the Underwriters. They appeared to approve thoroughly of the system, but in order not to move too fast have merely continued the Committee for further investigation.

Parts 5 and 6 also include a general discussion of this whole question of improvement in the Code. The Committee believes thoroughly in the Code, and that it should provide for the best standard of wiring. This means that as the industry develops the Code must change with it. Up to this time the existence of the Code has checked to some extent the development of any system calling for thinner parts or less insulation, and the result has been a steady increase in the cost of wiring, which is a menace to our industry.

Discussed by Cantrell, Doane, Jones, Lloyd, Sargent, Woodward, Zeigler. 308

JENKINS, F R *Report of Committee on Education of Salesmen* For the benefit of small companies, which are usually unable, for financial reasons, to conduct an organized educational department, the Committee on Education of Salesmen has prepared a prospectus outlining a course of schooling for the salesmen in central-station commercial departments. The Committee has further taken upon itself the organization of educational departments in many of the company sections. A subscriber to the course is to receive one lesson each month and will be expected to set aside enough time once each month to discuss thoroughly all questions pertaining to the lesson, under the direction of the class leader and the head of the department in which he works. The Committee has requested the cooperation of every company to insure the financial support necessary for properly conducting the work. The course includes instructions on selling, measuring energy and rates, illumination, and applications of motors. Under selling will be treated the characteristics of a good salesmen, the essentials of selling campaigns, locating and following up prospective customers, advertising, merchandising, and relations with customers. Instructions regarding illumination deal with the characteristics of illuminants, maintenance and operating expenses, application of various units, lighting practice, display lighting and wiring. Under motor applications are discussed first cost, the characteristics and applications of motors, methods of proceeding to replace steam, gas and oil engines, the relative values of isolated-plant and central-station service, and the analysis of problems encountered in introducing central-station service.

Discussed by Ballard, Callahan, Eddy, Gilchrist, Kennedy, Leach, Lloyd, Orr, Osborn, Pitts, Young. 40

LEARNED, J G *Report of Committee on Membership* As the table of membership by States shows, there is a large increase in the number of new members. One element particularly which has contributed to the success of the Committee's work is the large number of section members who have enthusiastically given their time to it. Personal solicitation has proved far more effective than follow up letters or literature.

Consideration has been given to the importance of obtaining central station men actively engaged in the commercial side of the business as such men immediately become a force in the organization. Central station companies are already inclined to regard membership as a recommendation when considering promotion to positions of larger responsibility.

The slogan for 1913 is repeated

THE MORE MEMBERS THE MORE VALUE TO EACH MEMBER.

Discussed by Burnett, Callahan. 11

MCDOUGAL, J H *Report of the Power Sales Committee on Typical Power Sales Development in the West* The Committee feels that there are few if any installations peculiar to the West alone. However, in selecting from the large amount of material collected, the latest installations of classes of business which are perhaps more fully developed in the West are described. Gold dredging, mining and milling, copper mining and smelting naturally get a good share of attention, but such unusual business as giant powder and rubber manufacturing, sugar refining and wireless telegraphy have received notice. The points of interest in each installation have been given and while the data are of tremendous value it is the belief of the Committee that the most far reaching result of the Report will be in suggesting new lines of business to follow up.

Much detailed data on specific installation have been prepared in connection with this report, which are available to members on application to Association headquarters or to members of the Power Sales Bureau Committee, since it is impracticable to include them in the scope of this printed report.

Discussed by Bushon, Kennedy, Knowlton, Learned, Lloyd, Stevens, Weaver. 63

MCKNIGHT, W M Paper *A Stassano Furnace Installation at Redondo, Cal* In the advancement of the application of electrical energy to new purposes the electric furnace offers an interesting study and gives promise of a wide field of usefulness.

The Stassano arc furnace installation is described explaining why the electric arc furnace secures a more uniform grade of steel and increases the capacity of a foundry, incorporating a description of the character of the linings of the furnace, cost of same, description of product, size and quality of castings, process of melting, detail of furnace, consumption of energy, electrical equipment and measuring instruments, source of supply of raw material, ingredients used in refining the steel and affects of the load on the distributing system.

The distinguishing feature of this furnace is that fusion is by radiant heat from an electric arc from two to three inches above the metal and approximately twenty-four inches from the roof of the furnace, in a closed chamber with neutral atmosphere, for the chemical reactions which take place in the process of refining.

Furnace suspension, metering and switch protection are described, the products are listed, and a full discussion of electrodes, their size, placing and efficiency is given. The argument is made that for one entire class of work the electric furnace is already beyond the experimental stage and its value and merit as a great current-consuming commodity are established.

Discussed by Childs, DellPlain, Kearns, Learned, Loebell, Schneider. 391

MOORE, C C Address Of the 850 conventions that have chosen San Francisco as their meeting place for 1915 the electrical men are especially welcome, since the greatest advance marked by this Exposition is its electric illumination. The entire exposition is a great electrical exhibit on a scale more elaborate and comprehensive than ever before attempted. This should be a matter of pride to electrical men. Attention is called to the great hydroelectric developments on the Pacific Coast and a tribute paid to Mr. John A. Britton as the general manager of the greatest system of its kind in the country and also to the work of Mr. Britton in connection with the Exposition. Acknowledgment is made also of the work of Mr. W. D'Arcy Ryan. 58

RUSSELL, C J *Report of the Power Sales Bureau of the Commercial Section* This report reviews the work done by the Power Sales Bureau since its organization at the Philadelphia Convention.

The details of the sub-division of the work among 17 main and 29 sub-committees are given. The efforts being made to avoid duplication of work and to effect co-operation on the part of the Power Sales Bureau and other committees of this and other associations are set forth.

Details are given as to the work of standardizing the collection of statistics and data and the establishment of a clearing house at headquarters for handling this work. Recommendations are made for extending the usefulness of the Power Sales Bureau and for co-operation between the Power Sales Bureau and the Committee on Electrical Salesman's Handbook

Discussed by Burnett, DellPlain, Knowlton, Learned, McDougal, Mateer. 361

RUSSELL, C J *Report of Sub-Committee on the Electrical Salesman's Handbook* 30

SMITH, F W *Report of the Lamp Committee* The report in its introduction reviews the work of the Committee, particularly with respect to direct contact throughout the country with member companies.

Lamp sales are shown to have fallen off over the preceding year (1913) owing to disturbed conditions, whereas the increase over 1912 was 11 per cent. The mazda lamp now totals over 70 per cent of the domestic lamp sales or 2 1/3 times the sales of all other lamps combined. By reference to table and curve presented within the report, the general trend of lamp sales may clearly be observed.

Under "Development" the Committee has treated rather fully the important steps and progress made by the manufacturers throughout the year, including description and illustration of new shapes for bulbs, ventilation, efficiency, mounting of tungsten filament in vacuum lamps and other details. New types of lamps standardized since May 1, 1914, are listed in full. Lamp prices are shown to have been reduced from time to time.

A brief but interesting paragraph with curves illustrating the point shows the per cent reductions that have taken place in the cost of electric illumination over a period of 20 years.

Municipal street lighting with the mazda C lamp is treated at some length, the report showing a considerable increase by central station companies in this class of business with the new illuminants. An interesting device for calculating life under this heading is illustrated and described as are a number of commercial applications of the mazda C lamp.

The question of fixtures now available for the higher efficiency lamps is treated at length and in detail.

New uses that have been developed for incandescent illuminants with the introduction of the higher efficiency lamps are described and reference is made to certain publications under this heading.

The Committee then treats the subject of standard voltage and the matter of company lamp policy. Central station companies should seek to continue their supervision over the lamp situation for the protection of their customers.

Discussed by Burnett, Coleman, Doane, Gilchrist, Howell, Jones, Law, Millar, Rolinson. 248

Snyder, F T Paper *Electric Furnace Power Loads* Electric furnaces at present use a million electric horse-power. This load is now entering upon a period of rapid growth. The principal developed fields are in the melting of metals, especially steel, and in high temperature chemical work. The load-factor, peak time, voltage and frequency make this load suitable for central station service.

It has been found that single-phase furnace loads can be obtained more readily than three-phase loads. This is due to the lower cost of operation of single electrode furnaces. Part of the energy in an electric furnace is absorbed at 100 per cent efficiency by the material under treatment and is removed from the furnace with the material. In addition to this a considerable amount of energy is lost in radiation and conduction. This heat loss, the refractory and electrode consumption and the furnace labor increase with the number of electrodes used.

Commercially, electric furnace loads develop most rapidly with single-phase furnaces, just as street car loads have developed most rapidly with direct current. The power companies can bring about the growth of this furnace load speedily by arranging to supply single-phase service.

Discussed by Childs, DellPlain, Kearns, Learned, Loebell, Schneider. 399

Stevens, C H Paper *Power Sales Methods: Demonstration of a Power Sale* The object of this paper is to develop some suggestions in handling power sales work by giving an analysis of one complete power sale.

The subject being broad, it is attempted to give only a general outline of the course pursued in a typical proposition which embodies as many phases of the work as are usually found in one transaction and deal principally with the methods followed and some of the principal arguments advanced.

The first part of the paper outlines a typical organization to handle the work and its general equipment, and then shows the course pursued when the lead is first received, and how the salesman after some difficulty with the architects and owners, obtains permission to test their present plan and to submit a proposition for operating on central station service. The result of the test made is shown and a typical proposition is presented.

Then follows the adverse report made by the Consulting Engineer on the proposition and finally the arguments which the salesman presents to refute these criticisms and to convince the owners that central station service will prove more economical than the private plant.

Discussed by Burnett, Childs, Criddle, DellPlain, Jones, Kennedy, Klauber, Knowlton, Learned, Littlefield, Lloyd, McDougal, Mateer, Osborn, Pitts, Stannard, Walton. 417

TURNER, M E *Report of Committee on Commercial Department Terminology*

Discussed by Burnett, Gibbs, Kennedy. 50

YOUNG, R R *Report of Committee on Merchandising and Recent Developments in Electrical Appliances* This report covers four different phases of merchandising, presenting a study of the subject under the headings "Analyzing the Market," "Factors in Creating a Demand," "Managerial Point of View," "Detailed Handling of Retail Sales," "Campaigns" and "Buying." It also touches on advertising, showing the need of co-operative work between the manufacturers and central station managers, comparative methods of advertising, value of card file and mailing lists and the cumulative value of advertising. The theory and practical handling of merchandise displays both in show windows and in interiors is given in careful detail.

The report considers further the education of the right sales people for adequate representation of the Company's policies, as well as their training for volume of sales results.

The especial attention of the Association is called to the suggestions here given for the development of the industrial appliance business. Perfect co-operation between manufacturers and central stations is the first essential. Current revenue will be the increasing reward of the central station in any locality where industrial appliance needs are intelligently interpreted. A list of some successful installations of standard appliances is given.

The Committee has made a study of recent development in all electrical appliances, getting central station suggestions for improvements on standard appliances, and manufacturers' ideas as to present efficiency and prices, and future development and prices. These ideas are listed.

The report includes also a list of available electrical apparatus for various industries, a directory of electric appliance manufacturers, various forms and outlines, and a bibliography of sources of information on all subjects of the report. It also includes a list of books which should be helpful to the progressive new business man in studying the merchandising subject.

Discussed by Briggs, Callahan, DellPlain, Hogue, Johnson, Loebell, Osborn, Stannard. 100

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		Presidents
1st	Chicago, Feb 25-26, 1885	James F Morrison
2nd	New York, Aug 18-20, 1885	James F Morrison
3rd	Baltimore, Feb 10-12, 1886	James F Morrison
4th	Detroit, Aug 31-Sept 2, 1886	James F Morrison
5th	Philadelphia, Feb 15-17, 1887	James F Morrison
6th	Boston, Aug 9-11, 1887	James F Morrison
7th	Pittsburgh, Feb 21-23, 1888	James F Morrison
8th	New York, Aug 29-31, 1888	Samuel A Duncan
9th	Chicago, Feb 19-21, 1889	Samuel A Duncan
10th	Niagara Falls, Aug 6-8, 1889	Edwin R Weeks
11th	Kansas City, Feb 11-14, 1890	Edwin R Weeks
12th	Cape May, Aug 19-21, 1890	Marsden J Perry
13th	Providence, Feb 17-19, 1891	Marsden J Perry
14th	Montreal, Sept 7-10, 1891	Charles R Huntley
15th	Buffalo, Feb 23-25, 1892	Charles R Huntley
16th	St Louis, Feb 28-Mar 2, 1893	James I Ayer
17th	Washington, Feb 27-March 2, 1894	Edward A Armstrong
18th	Cleveland, Feb 19-21, 1895	M Judson Francisco
19th	New York, May 5-9, 1896	C H Wilmerding
20th	Niagara Falls, June 8-10, 1897	Frederic Nicholls
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22nd	New York, May 23-25, 1899	Alden M Young
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25th	Cincinnati, May 20-22, 1902	Henry L Doherty
26th	Chicago, May 26-28, 1903	Louis A Ferguson
27th	Boston, May 24-26, 1904	Charles L Edgar
28th	Denver-Colorado Springs, June 6-11, 1905	Ernest H Davis
29th	Atlantic City, June 5-8, 1906	William H Blood, Jr
30th	Washington, June 4-8, 1907	Arthur Williams
31st	Chicago, May 19-22, 1908	Dudley Farrand
32nd	Atlantic City, June 1-4, 1909	William C L Eglin
33rd	St Louis, May 23-27, 1910	Frank W Frueauff
34th	New York, May 29—June 2, 1911	W W Freeman
35th	Seattle, June 10-14, 1912	John F Gilchrist
36th	Chicago, June 2-6, 1913	Frank M Tait
37th	Philadelphia, June 1-5, 1914	Joseph B McCall
38th	San Francisco, June 7-11, 1915	Holton H Scott

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1914-1915

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Commercial Sessions

COMMERCIAL SESSIONS

FIRST COMMERCIAL SESSION—JUNE 8

1—Address of Chairman of Section DOUGLASS BURNETT

2—Report of the Commercial Section Finance Committee J F BECKER

3—Report of the Commercial Section Membership Committee J G LEARNED

4—Report of the Publications Committee E A EDKINS

5—Report of Sub-Committee on the "Electrical Salesman's Handbook" C J RUSSELL

6—Report of Committee on the Education of Salesmen F R JENKINS

7—Report of Committee on Commercial Department Terminology M E TURNER

SECOND COMMERCIAL SESSION—JUNE 9

1—Address C C MOORE, President Panama-Pacific Exposition

2—Report of Committee on Typical Power Sales Development in the West J M McDOUGAL

3—Report of Committee on Merchandising and Recent Developments in Electrical Appliances R R YOUNG

THIRD COMMERCIAL SESSION—JUNE 9

1—Report of the Lamp Committee F W SMITH

2—Report of Committee on Wiring of Existing Buildings R S HALE

FOURTH COMMERCIAL SESSION—JUNE 10

1—Report of the Rate Research Committee R S HALE

2—Report of the Power Sales Bureau of the Commercial Section C J RUSSELL

3—Paper: "The Commercial Application of Electric Resistance Furnaces" C W BARTLETT

4—Paper: "A Stassano Furnace Installation at Redondo, Cal." W M McKNIGHT

5—Paper: "Electric Furnace Power Loads" F T SNYDER

FIFTH COMMERCIAL SESSION—JUNE 10

1—Paper: "Power Sales Methods: Demonstration of a Power Sale" C H STEVENS

2—Report of Committee on Chairman's Address

3—Report of Section Nominating Committee

4—Election of Commercial Section Officers

FIRST COMMERCIAL SESSION

TUESDAY AFTERNOON JUNE 8 1915

MR. L. D. GIBBS, Third Vice-President: The first session of the Commercial Section will please come to order. The opening is a trifle delayed to-day by reason of a meeting of the Executive Committee. The first number on the program for the afternoon is the address of Mr. Douglass Burnett of Baltimore, the Chairman of the Section.

ADDRESS OF THE CHAIRMAN OF THE SECTION

Your present Chairman took up his duties February 13th, upon the resignation of Mr. E. L. Callahan, whom you elected as Chairman at the last Convention. It has been his aim to continue the work so splendidly and successfully started by Mr. Callahan, to the end that the 1915 Convention of the Commercial Section shall be the richest of all in results and that all the aims of your previous Chairman, Mr. Callahan, shall have been fully accomplished.

The work of the Commercial Section during the past year has been characterized by several notable events and by progressive action which cannot fail to improve the personnel of our organization and result in benefit to our industry.

A tremendous amount of work has been done by the Section this year. The Committee on Wiring of Existing Buildings has made a long step toward standardizing plugs and receptacles and the adoption of certain new and improved methods of wiring of existing buildings which is a class of new business needing greater exploitation.

The Committee on Education of Salesmen has, after several years of earnest work and thought, prepared what promises to be a most successful and widely adopted correspondence course, which with proper support will grow in scope and become comprehensive.

The Committee on Merchandising has given you the last word on the subject in its present development, insofar as it applies to the central station industry; to date this Committee has worked incessantly and has supplied new and important matter for our members.

The Publications Committee, following arrangements for revision by the Wiring Committee, has exploited Cushing's *Wiring Manual* and has done much towards spreading a better knowledge of standard methods of wiring. This Committee has completed the distribution of nearly a million pieces of matter, including the Residence Service Campaign and other Section literature, at a profit to the Section.

The Publications and Handbook Committees united have provided us with a sufficient stock of new Handbooks to care for the growth in membership incident to the new arrangement under which Class B and E members may become Commercial Section members without the payment of additional dues. The membership of our Section promises to increase considerably as a result of this step, and the work of our Commercial Section will thus be done more effectively, because its membership will more nearly cover the field represented by the activities of commercial men in the Association.

The sound principles and business-like conduct of Section financial affairs is the result of earnest labor of our Finance Committee members, in co-operation with the various committees, therefore the finances of our Section are on a satisfactory basis. This has been true to such an extent that the main Executive Committee of the Association approved without question the budget and appropriation asked for by your Section officers for the current year.

The Power Sales Bureau of the Commercial Section has become of such importance that two sessions have been set aside on our program at this Convention for its deliberations. The reports of the sub-committees of this Bureau are replete with constructive information and with records of constructive work looking to the strengthening of power sales among member companies. Correspondence has been had with Mr. D. B. Rushmore, representing the Industrial Power Committee of the American Institute of Electrical Engineers, representing that it would be to the advantage of all concerned if that Committee were to publish its data in accordance with the standard Handbook sheet of the N. E. L. A. Commercial Section, and Mr. C. J. Russell, Chairman of the Power Sales Bureau of the Commercial Section N. E. L. A. is actively co-operating with Mr. Rushmore and others in this matter.

The Chairman of the Commercial Section is charged with the responsibility of acting as a Committee of One on Foreign Relations and in this connection, it is a pleasure to note the cordial reception by the National Commercial Gas Association of suggestions for co-operative work. The fact that there has been little call upon your Chairman to handle foreign relations may, under the circumstances, be taken as the best evidence that our relations with sister societies are on a satisfactory basis.

Some steps have been taken to formulate a separate organization for those connected with the sale of hydro-electric power in the South, and an invitation was issued to the gentlemen interested to affiliate with the Commercial Section through the Power Sales Bureau, with the result that we expect to develop co-operative work which will bring known improvements in this branch of the industry. Similar invitations were issued to those interested in the formation of an Industrial Electric Heating Association. Your Chairman was one of a Committee of the N. E. L. A. to invite affiliation by those who have since formed the National Association of Supply Manufacturers.

While your present Chairman has served as vice-chairman and has been actively participating in the work and growth of the Section, yet since his responsibilities as Chairman of the Section have covered so short a time, it is not proposed to go into any further details of the work that has been accomplished during his incumbency. The full and rich nature of the Committee reports and of the continuous work done by these Committees speaks for itself, and we look forward to the coming year to see this work carried on successfully and well.

It is for your Section Executive Committee to consider how far the activities of the Section shall be conducted during the next year and along what lines, but your Chairman recommends the continuance of certain activities along present lines, especially insofar as such work as that of the Wiring Committee and of the Education Committee is concerned, with the expectation that the Wiring Committee will secure the actual approval and adoption of its new and improved methods; that the Education Committee shall make its proposed course successful and shall prepare for further courses for specialists, and naturally the Publications Committee should be continued in order to effect the distribution of suitable matter in such a manner as will cause the Section to be so far as possible self-sustaining.

Respectfully submitted,

DOUGLASS BURNETT, *Chairman.*

MR. GIBBS: You have heard the address of the Chairman. A motion is in order to refer it to a Committee. All in favor will signify by saying Aye.

(Motion made, seconded and carried)

I will appoint on that Committee Messrs. John G. Learned, S. V. Walton, and E. L. Callahan.

I now take pleasure in placing the session in the hands of the Chairman.

CHAIRMAN BURNETT: The next order of business, gentlemen, is the report of the Commercial Section Finance Committee. In view of the absence of Mr. J. F. Becker, Chairman of the Committee, I will ask Mr. E. A. Edkins of Chicago, who is a member of that Committee, to present the report.

REPORT OF THE COMMERCIAL SECTION FINANCE COMMITTEE

Following the practice of previous years, the Finance Committee of the Commercial Section of the National Electric Light Association desires to submit the condition of the finances of the Section as of the year ending December 31, 1914, and it is gratifying to point out that the surplus for the year 1914 amounts to $2,959.69 as against a credit balance of $610.38 the previous year. This showing is undoubtedly due to the success met by the Publications Committee; the revenue from sales of publications during the year 1914, amounting to $12,097.71 as against $5,791.30 the previous year.

The above figures show that the Section is on a better financial basis than ever before and is now in a position that is self-supporting.

A recent constitutional provision provides for the appropriation of an amount not to exceed $2.50 per member for every member of the National Electric Light Association who affiliates with the Commercial Section. This amount is appropriated to cover the expense of publishing and issuing the Handbook to new members and it is the purpose of the Executive Committee to operate in such a manner as to make the net expenditure per member as small a proportion of this amount as possible.

It is anticipated that under the new regulations, the Commercial Section membership will increase considerably. Provision has been made in the budget and by the Executive Committee to take care of this growth, and all members affiliated with the Commercial Section will receive the printed matter, etc., to which they are entitled under their membership.

The Committee feels that the Section is to be congratulated on its remarkable showing and with the further support of the Publications Committee earnestly solicited from the member companies, this excellent financial condition can be maintained without assistance from outside sources.

Herewith is given a detailed report covering the financial standing of the Section.

Respectfully submitted,

J F Becker, *Chairman*
E A Edkins, *Vice-Chairman*
F H Gale
J C McQuiston
L R Wallis

COMMERCIAL SECTION

OF THE

NATIONAL ELECTRIC LIGHT ASSOCIATION

BALANCE SHEET

AS AT DECEMBER 31, 1914

ASSETS

Cost of furniture turned over to the Association	$ 323.23	
Less depreciation—1912, 32.32; 1913, 29.09; 1914, 26.18	87.59	
		$ 235.64
Inventory of publications		$ 1,493.72
Accounts Receivable		
Fixed dues	$ 340.50	
Publications	1,930.67	
		$ 2,271.17
		$ 4,000.53

LIABILITIES

Prepaid dues		$ 10.00
Advanced by N. E. L. A.		420.46
Total liabilities		$ 430.46
Profit and Loss		
Credit balance December 31, 1913	$ 610.38	
Surplus for the year as per Income Account	2,959.69	
		$ 3,570.07
		$ 4,000.53

INCOME ACCOUNT

YEAR 1914

EXPENSES

Running Expenses			
Salaries and wages		$ 1,328.41	
Expressage and messenger		82.99	
Postage, telegraph and telephone		40.83	
Printing and stationery		59.46	
Miscellaneous running expenses		314.03	
Convention expenses		80.95	
Publication Committee expenses		6.83	
Uncollectible dues		192.50	
Uncollectible bills		74.80	
Membership campaign expenses		16.80	
Depreciation		26.18	
			$ 2,223.78
Costs of Publications (less inventory)			
Electric Service in the Home		$ 392.88	
Store Service		309.52	
Electric Equipment of the Home		1.50	
Home Thoughts Electric		474.90	
Farm Help		88.30	
Church Lighting		127.53	
Industrial Lighting		4.25	
Residence Service Campaign		5,438.60	
Gifts That Please		1,144.75	
			$ 7,982.23
Electrical Salesman's Handbook	$2,410.16		
Electrical Salesman's Handbook binders	960.65		
		3,370.81	
			$11,353.04
			$13,576.82
Surplus for the period			2,959.69
			$16,536.51

REVENUES

Revenue from fixed dues		$ 3,927.00
Revenue from Sale of Publications		
Industrial Lighting	$ 445.75	
Ornamental Street Lighting	44.60	
Electrical Equipment of the Home	125.50	
Solicitors' Handbook	44.00	
Electric Service in the Home	710.20	
Store Service	420.60	
Home Thoughts Electric	1,044.05	
Church Lighting	227.40	
Farm Help	44.80	
Residence Service Campaign	6,977.44	
Gifts That Please	1,998.50	
Miscellaneous	14.87	
	$12,097.71	
Electrical Salesman's Handbook with binder and case, quarterlies, etc.	419.15	
Electrical Salesman's Handbook binders	92.65	
		$12,609.51
		$16,536.51

Mr. Edkins (continuing): I presume, Mr. Chairman, as all of the members present have a copy of the Balance Sheet before them, that it will hardly be necessary to read it.

Chairman Burnett: It will be just as well to say a few words about the surplus.

Mr. Edkins: The balance sheet shows that the assets of the Association as of December 31st are $4,000, and the total liabilities $540; profit and loss show a credit balance on December 31st of $610, and a surplus for the year, as per income account, of $2,959, making a total of $3,570. That tells the story in brief, and the income account is analyzed on the following page. The revenues shows a very satisfactory distribution of the publications put out by the Section during the year. The gross revenues for fees and dues amount to $3,927; from the sale of publications, $12,097. A more extended reference to revenues from the sale of publications will be found in the report of the Committee on Publications.

Chairman Burnett: You have the report of the Finance Committee before you. Is there to be any discussion on it? What is your pleasure with reference to this report?

Mr. E. L. Callahan, Chicago: I move you that the report of the Finance Committee be accepted.

(Motion duly seconded and carried)

Chairman Burnett: We will next hear the report of the Membership Committee, by Mr. J. G. Learned of the Public Service Company of Northern Illinois.

REPORT OF THE COMMERCIAL SECTION MEMBERSHIP COMMITTEE

ORGANIZATION

Your Membership Committee as originally appointed consists of a Chairman and three Vice-Chairmen, one representing the East, one the Middle West and one the Far West, together with members from almost every section of the country. The Commercial Section officers before appointing this Committee apparently treated the subject of increasing the Commercial Section membership with much consideration, for as the Commercial Section membership grows, so likewise does its important work.

The Committee deemed it advisable to proceed with its work of securing members with the least possible delay and, therefore, did not hold a meeting of its members but conducted its work by correspondence. The United States was divided into four sections, the states in each Section being under the direction of their chairman and vice-chairman, a chairman being appointed for each state, as listed in the appendix. Each state chairman appointed a state committee. The work of this committee, therefore, has been actively prosecuted and closely supervised in each state in the Union.

A list of the present N. E. L. A. members, on which was checked the members of the Commercial Section, was sent to each member of the committee and each state chairman in order that energetic effort should be well directed.

Follow-up letters have been sent to all prospects, backed up with magazine advertisements and announcements, outlining the desirability of becoming affiliated with the N. E. L. A. and the Commercial Section thereof, and reciting the advantages accruing to its members. The various electrical magazines have been very generous in allotting space to your Committee and it is opportune here to give expression of thanks for their invaluable co-operation.

The N. E. L. A. BULLETIN has co-operated by frequently publishing matter pertaining to the Committee and its work. A departure from custom is here noted in the printed application blank in the BULLETIN which has been a means of securing a large number of new members.

The Secretary and his force were enlisted in the work of the Committee and responded most loyally by supplying lists of prospects and valuable suggestions for furthering the work.

One element particularly which has contributed to the success of the Committee's work is the large number of members who have enthusiastically labored to secure new members not only for the Section but also for the parent organization. The personality of each member of the Committee has been injected into this campaign and proves conclusively that personal solicitation is more effective than follow-up letters or literature. Those companies having Sections aided materially in the final results obtained through the local membership committees.

RESULTS

A brief history of the membership development of the Commercial Section may be of interest.

The Commercial Section was formed in St. Louis in 1910 with an active membership of 163.

January 1, 1912	939 members
January 1, 1913	1102 "
January 1, 1914	1505 "
July 1, 1914	1574 "
January 1, 1915	1553 "
April 21, 1915	2542 "
Total net gain during present administration	968 "

SUMMARY BY STATES OF NEW COMMERCIAL SECTION MEMBERS ENROLLED SINCE JANUARY 1, 1915

Alabama	2	New Jersey	128
Alaska	..	New Mexico	..
Arizona	1	New York	114
Arkansas	..	N. Carolina	3
California	63	North Dakota	..
Colorado	2	Ohio	54
Connecticut	19	Oklahoma	2
Delaware	4	Oregon	5
District of Columbia	2	Pennsylvania	239
Florida	3	Philippine Islands	6
Georgia	4	Porto Rico	1
Hawaii	1	Rhode Island	28
Illinois	75	S. Carolina	1
Indiana	5	South Dakota	..
Iowa	11	Tennessee	2
Kansas	1	Texas	3
Kentucky	3	Utah	1
Louisiana	1	Vermont	3
Maine	13	Virginia	19
Maryland	57	Washington	2
Massachusetts	103	W. Virginia	..
Michigan	9	Wisconsin	17
Minnesota	4	Australia	1
Mississippi	..	Canada	4
Missouri	56	Mexico	2
Montana	2	New Zealand	1
Nebraska	4		
Nevada	..	Total	1085
New Hampshire	4		

The figures given for 1915 record only those who have paid their annual N. E. L. A. dues for that year. The fact that the Commercial Section annual dues of $2.50 were waived, commencing January 1st, 1915, has been the means of bringing in members who otherwise might not have become affiliated with the Section.

The work of this Committee has been conducted at practically no expense to the Association. If it were wise to spend a considerable sum of money on a membership campaign, there is no doubt that the membership would receive a great impetus, but it seems poor economy to spend money in getting members who might be apathetic afterward.

Members in good standing during 1914, unless notifying us to the contrary, are considered as continuing in the Commercial Section, and will receive all additional Salesman's Handbooks as issued during 1915. New members have been supplied with the complete present edition of the Salesman's Handbook upon payment of dues, and will receive also the additional loose-leaf sheets for this, as issued, so long as they remain in good standing and continue their affiliation. Members who change to another Section thereby tender their resignations to the Commercial Section, as they are eligible to membership in but one Section during the calendar year.

In campaigning for new Commercial Section members, some consideration has been given to the importance of obtaining central station men actively engaged in the commercial side of the business rather than to merely swelling the membership, as the expense involved to the parent body is greater than the annual dues received, and it is desirable to spread the appropriation where the most good will result. Too frequently effort is directed toward securing members for the Commercial Section who are engaged in branches of the industry other than commercial, resulting in a partially inactive membership. This effort is ill-advised and mis-directed and the practice above outlined should be followed.

The prospective N. E. L. A. or Commercial Section member should be impressed with the fact that this is not merely an honor or a private advantage but amounts to publicly assuming the attitude expected of all our successful men—the hall mark of leadership. Central station companies are already inclined to regard membership as a recommendation when considering which employees are to be advanced to positions of larger responsibility, and non-membership is even now a distinct handicap. The man who is not awake to the possibilities of the N. E. L. A. of necessity cannot be living up to the standards of his position.

CONCLUSION

Your Committee desires to express its thanks and appreciation to those who have so untiringly and enthusiastically cooperated with it, and particularly to the State Chairmen, who, realizing and appreciating the value of membership, have been glad to exert their influence to extend its benefits, and we reiterate in conclusion the Slogan announced by our ex-chairman, Mr. E. W. Lloyd, in his 1913 address:

"THE MORE MEMBERS THE MORE VALUE TO EACH MEMBER"

Respectfully submitted,

JOHN G LEARNED, *Chairman*
F D BEARDSLEE, *Vice-Chairman*
L D GIBBS, *Vice-Chairman*
S V WALTON, *Vice-Chairman*
W A BLIND, *Secretary*

W R COLLIER
E R DAVENPORT,
J E DAVIDSON
W A DONKIN
N B HICKOX
F H HILL
H E HOBSON
T F KELLEY
GEORGE C OSBORNE

M C OSBORN
F D PEMBLETON
J H PIEPER
H C RICE
C G SCHLUEDERBERG
A H SIKES
C N STANNARD
E B WALTHAL
T G WHALING

COMMERCIAL SECTION MEMBERSHIP COMMITTEE NATIONAL ELECTRIC LIGHT ASSOCIATION 1914—1915

Names in large capitals represent original Membership Committee as appointed by the Executive Committee of the N. E. L. A.

Names in small capitals represent the State Chairmen appointed by the Membership Committee.

Middle East Section John G Learned Chairman (Chicago)

Alabama	Birmingham	Frank Hammond Jr Birmingham Ry Lt & Pwr Co
Florida	Tampa	G H Wygant
GEORGIA	Atlanta	W R Collier Georgia Railway & Power Co
	Athens	A H Sikes Athens Railway & Elec Co
Illinois	Chicago	Oliver R Hogue Commonwealth Edison Company
Indiana	Indianapolis	F A Elder Board of Trade Bldg
Kentucky	Louisville	F A C Tocque Louisville Gas & Elec Co
Michigan	Adrian	H A Fee
Mississippi	Meridian	John O Chappell Meridian Light & Power Co
OHIO	Dayton	Thomas F Kelly Dayton Power & Light Co
	Cleveland	H C Rice Gen Inc Lamp Works of G E Co
TENNESSEE	Knoxville	Norman B Hickox Greenwood Advertising Company
Wisconsin	Milwaukee	George Allison Care Clement C Smith
Canada	Toronto	M C Gilman Toronto Elec Lt & Pwr Co

Middle West Section F D Beardslee Vice-Chairman (St Louis)

Arkansas	Little Rock	A E Smith Little Rock Ry & Elec Co
Iowa	Keokuk	N T Wilcox Mississippi River Pwr Co
Kansas	Topeka	A H Purdy Topeka Edison Company
Louisiana	New Orleans	A E Clement 201 Baronne Street
Minnesota	St Paul	Fred A Otto St Paul Gas Light Co
Missouri	Kansas City	Gordon Weaver 1500 Grand Avenue
Nebraska	Lincoln	J E Shuff Lincoln Gas & Elec Co
North Dakota	Fargo	M L Hibbard Union Light Ht & Pwr Co
Oklahoma	Oklahoma	J M Brown Oklahoma Gas & Elec Co
South Dakota	Sioux Falls	N C Draper Sioux Falls Lt & Pwr Co
TEXAS	Dallas	H E Hobson Southwest General Elec Co

Eastern Section L D Gibbs Vice-Chairman (Boston)

Connecticut	Thompsonville	W P Schwabe Northern Conn Lt & Pwr Co
Delaware	Wilmington	D L Ott Wilmington & Phila Tr Co
Maine	Augusta	H W Eells Central Maine Power Co
MASSACHUSETTS	Boston	Vice-Chairman L D Gibbs 1123—149 Tremont Street
	Randolph	E S Hamblem Randolph & Holbrook Elec Co
Maryland	Baltimore	F M Weller Consolidated Gas El Lt & Pr Co
New Hampshire	Manchester	George H Sander Manchester Traction Lt & Pr Co
NEW JERSEY	Newark	F D Pembleton Public Service Corporation
	Harrison	George C Osborne General Electric Co
NEW YORK	New York	T G Whaling 1261 Broadway
	Elmira	F H Hill Elmira Water Lt & Pr Co
North Carolina	Asheville	W T Weaver N Carolina Elec Pwr Co
PENNSYLVANIA	Pittsburgh	W A Donkin Duquesne Light Co C G Schleuderberg Westinghouse El & Mfg Co
	Bloomsburg	S C Pohe
RHODE ISLAND	Providence	E R Davenport Narragansett El Ltg Co
	Woonsocket	A F Townsend Blackstone Valley Gas & El Co
South Carolina	Charleston	P H Gadsden Charleston Cons Ry & Lt Co
Vermont	St. Albans	W H Vorce Vermont Power & Mfg Co
Virginia	Roanoke	W G Clayton Roanoke Ry & Elec Co
W Virginia	Parkersburg	L C Allen Consolidated Lt Ht & Pr Co

Western Section S V Walton Vice-Chairman (San Francisco)

Arizona	Mesa	H L Chandler South Side Gas & Elec Co
CALIFORNIA	San Francisco	Vice-Chairman S V Walton Pacific Gas & Electric Co
	Los Angeles	J H Pieper Southern California Edison Co
	Fresno	E B Walthal San Joaquin Gas & Elec Co
COLORADO	Denver	C N Stannard Denver Gas & Elec Co
Idaho	Boise	W H Trask Idaho-Oregon Light & Power Co
Montana	Billings	J F Roche Billings & Eastern Montana Pr Co

New Mexico	Albuquerque	A F VanDeisne Albuquerque Gas Elec & Pr Co
Nevada	Reno	E G Hoy Truckee River Gen Elec Co
OREGON	Portland	J E Davidson Pacific Power & Light Co
Wyoming	Rawlins	J H Jaccobucci Rawlins Elec Lt & Fuel Co
WASHINGTON	Spokane	M C Osborn Washington Water Power Co

DISCUSSION

Mr. Callahan: As a sort of supplement to the report, I wish to state that at the present time the membership of the National Electric Light Association is over 13 000, of which number there are possibly three thousand in the Commercial Section, or about 23 per cent of the total Association membership.

Chairman Burnett: Is there to be any discussion? We want to get the greatest value possible out of this membership report.

I would like to ask a question. Has the Membership Committee estimated the proportion of membership between those west and those east of the Mississippi? We would like to know how our membership is divided? Do you know, Mr. Learned?

Mr. Learned: We have not made an analysis of that. However, I think you could ascertain that very easily by going to the Secretary.

Chairman Burnett: One of the reasons why I ask is that the extent to which our Section is of service to our members might perhaps be judged partially by the representation from different parts of the country. If the section is doing good work, that is acceptable to those in the East, then we would naturally expect to get a good attendance from the East; if the work we are doing is interesting to the West, we should likewise expect to get a good attendance from the West. This is a National Association—we know neither States nor sections. If, on the other hand, we have a relatively small number of members here in the West, it would seem that we are not doing all that we should for our western members. I think, therefore, it is well for us to know if all sections of the country are properly represented in our membership.

MR. S. V. [illegible], San Francisco: I move the adoption of the report as read.

Motion seconded and carried.

CHAIRMAN [illegible]: We will now have the report of the Publications Committee by Mr. E. A. Edkins of the Commonwealth Edison Company, Chicago, Chairman.

REPORT OF THE PUBLICATIONS COMMITTEE

ANALYSIS OF SALES

Believing that a tabulation of sales during the last three years would be of interest to the members of the Commercial Section, your Publications Committee presents herewith a statement showing the number of pieces sold and the billed amounts for each of the Commercial Section's publications during the calendar years 1912, 1913, 1914 and for the first two months of 1915. This statement, which is printed in detail on another page and which shows a very gratifying growth in the volume of our transactions from year to year, is condensed as follows:

Year	No. copies Sold	Income From Sales
1912	109,201	$ 5,822.00
1913	163,866	6,263.85
1914	534,797	12,396.86
1915 (Jan. and Feb.)	9,745	1,390.27
Total	817,609	$25,872.98

The total number published by the Committee during the above period, including copies distributed at Conventions and sample copies sent to prospects, amounts to 836,586.

Notwithstanding the period of financial depression which has affected the entire industry during the last twelve months and which greatly increased the difficulties of your Committee in finding a market for these publications, it is gratifying to note that the sales for the ten months ending March 1, 1915, show an increase of $6,437.13 or 127 per cent over the sales for the eleven months period ending April 30, 1914 (as shown in our last annual report) representing an increase of 365,860 in the number of publications sold.

From May 1, 1914 to March 1, 1915, the total number of publications sold by your Committee was 488,541, which brings the total number of publications sold during the last three years to 817,609.

INVENTORY OF PUBLICATIONS AS OF FEBRUARY 28, 1915

Publications	No. on Hand	Amount
Electric Service	9,693	$ 145.39
Home Thoughts Electric	5,967	89.51
Church Lighting	829	37.30
Store Service	3,728	67.00
Electric Salesmen's Handbook	365	521.95
" " binders	284	156.20
" " extra issue	2,477	274.34
Cushing's Manual	115	67.16
Residence Service booklets	41,375	240.51
Total	64,833	$1,599.36

Deducting the cost of Handbooks and binders ($952.49) the inventory value of publications on hand amounts to $646.87.

ACTIVITIES DURING THE PAST YEAR

In our last annual report brief mention was made of the proposed issue of a *Residence Service Campaign* which was in course of preparation at the time the report for 1914 was being compiled. A comprehensive exhibit of Commercial Section publications was displayed in our Section Headquarters at the Philadelphia Convention and as the result of a vigorous campaign conducted by the Committee during the Convention, orders were taken for upwards of 15,000 sets or approximately half of the entire edition. This campaign was pushed energetically during the following three months by means of publicity secured through the medium of the technical press, the Association BULLETIN and an extensive direct-by-mail canvass of our member companies, the balance of the edition being practically sold out by the first of October. Not the least important factor in the success of this campaign was the so-called Residence Service "dummy," which consisted of an attractively printed 16-page booklet, size 10 by 14 inches, stitched with heavy brown silk cord, in which, preceded by an introductory statement to member companies, samples of the thirteen pieces of printed matter constituting the *Residence Service Campaign* were shown, for the purpose of presenting the proposition in an attractive manner to central station prospects. These dummies, printed in two colors, were mailed to over a thousand prospects and were largely instrumental in enabling your Committee to bring this campaign to an early and successful completion.

A marked tendency toward retrenchment was observed by the Committee in the course of its follow-up correspondence with member companies, as early as last July, and with the outbreak of the European war in August there was a sharp decline in orders for publications. It at once became apparent to the Committee that its plans for replenishing the depleted stock of existing booklets and for getting out new publications would have to be prosecuted with great caution. Numerous inquiries however, which were received by the Committee's Sales Manager, Mr. N. H. Boynton, indicated a considerable demand for certain individual pieces of the *Residence Service Campaign* from member companies who did not care to buy the entire series. After a careful survey of the field the Committee decided to make a special drive on the Christmas booklet, *Gifts That Please,* scheduled as No. 6 in the *Residence Service Campaign.* This campaign was started in October; each member of the Committee was given a certain territory and the entire central station field was solicited by personal correspondence, supplemented with advertising in the BULLETIN and in other publications. The campaign was practically completed within a period of six weeks and reference to the analysis of sales shows that the total sales in this campaign were 130,800 copies, for which the Section received $2,129.75.

At the Executive Committee meeting of the Section held in Boston, December 14, 1914, Mr. Hale reported that he had taken up with the Publications Committee the question of the desirability of getting out a handbook on standard wiring. In view of existing publications and also the great expense involved in getting out such a book, the Publications Committee did not feel warranted in undertaking this work; Mr. Boynton, however, had suggested to Mr. Hale the possibility of making some arrangement with the publishers of *Cushing's Manual* on Standard Wiring. As the result of this suggestion the Committee on Wiring of Existing Buildings prepared a considerable amount of data, and plans were discussed with Mr. Cushing for the publication of this material in the 1915 edition of the *Manual.* Mr. Cushing, who attended this meeting, expressed his desire to co-operate in every way possible with the Section and arrangements were finally made whereby the Section was enabled to purchase the *Manual* in lots of 100 or more copies at a reduced rate for re-sale to members at prices from 10 to 25 cents cheaper than the regular retail price. Inasmuch as this arrangement with Mr. Cushing enabled the Committee to publish a large amount of valuable, up-to-date wiring data for the benefit of our members, without incurring the heavy production expense that such a publication would involve, it was felt that there would be no impropriety in advertising this publication as widely as possible with the hearty endorsement of the Commercial Section. This booklet was accordingly featured on the second page of the February issue of the N. E. L. A. BULLETIN and some excellent publicity was secured in the *Jovian,* the *Stimulator* and in several other trade publications. These press notices in conjunction with the preliminary direct-by-mail campaign, covering about 800 companies, resulted in 150 orders for a total of 1452 copies of the *Manual,* which were billed for $1,173.00. This preliminary campaign was merely put out to test market conditions and probable demand; results were so satisfactory that your Committee at once proceeded with plans for a much larger campaign, based on a mailing list of about 8000 companies, including all of the central stations in the United States and Canada and a large number of contractors and architects. At the date of this report (March 1st) the Committee is preparing to launch this campaign with the confident expectation that it will result in pushing the sales of the *Manual* on standard wiring up to four or five thousand copies. The active co-operation of the officials of various geographic sections has been secured and member companies are ordering large quantities of the *Manual* for distribution either gratuitously or at a reduced cost among their employees.

PROPOSED PUBLICATIONS

In the last annual report, reviewing the activities of the Publications Committee for the eleven months' period ending May 1, 1914, your Committee referred to the proposed *Residence Service Campaign.* Advance copies of this campaign were subsequently prepared for the Commercial Section exhibit at the Philadelphia Convention. Upon the completion of this campaign it was realized that while we had practically exhausted the selling possibilities of the campaign as a complete series, there still remained a large field for the individual sale of the thirteen separate booklets and folders comprising the campaign. The results obtained from the special campaign on booklet No. 6, *Gifts That Please,* have already been stated in this report. The Committee now plans to make some changes in booklet No. 9, *The Wiring of the House,* including a new cover design, and to print a large special edition of this booklet, which will be featured in our publicity work during the next few months.

After referring in the last annual report to the proposed *Residence Service Campaign,* your Committee stated that "it has been suggested and urged that a similar store service campaign be prepared, and the Publications Committee is ready, willing and anxious to offer this as soon as the use for it is demonstrated and the *Residence Service Campaign* is an assured success." In view of the rapid development in new types of illuminants and also in view of the favorable replies which have been received with reference to prospective store campaigns, your Committee feels that its success with the *Residence Service Campaign* and the growing improvement in business conditions are sufficient warrant for putting out a *Store Service Campaign* at this time; it has therefore gone ahead with the preparation of this campaign, which will probably consist of five or six separate pieces of printed matter, and sample copies of the campaign will probably be ready for exhibition at the Convention.

A number of the larger central station companies are planning this year to make an aggressive invasion of the industrial lighting field. Too little attention has been paid to the proper lighting of factories, and many factory owners who have been taught to appreciate the economic value of central station power are still literally very much "in the dark" on the subject of shop illumination. So long as three years ago the Commercial Section recognized this situation and endeavored to meet the demand with a booklet which was issued in 1912 under the name of *Industrial Lighting.* Twenty-three thousand copies of this booklet have been sold and the edition was exhausted some time ago. *Industrial Lighting* still stands as one of the best booklets issued by the Commercial Section and with some necessary revision in order to bring it up to date, a great deal of the old text will probably be used in the new booklet which your Committee is now preparing. This booklet will be somewhat smaller than its predecessor and the Committee hopes to have it ready for publication by the first of August.

Electricity for Every Purpose
The Expert Wireman Leaves Your House In Perfect Order
Light Lunches for Hot Days
Give the old Kitchen Stove a Vacation
Summer Comfort
Spick and Span
Keep Cool
Ironing Out of Doors
Electrically Equipped Home
Clean the Electric Way
Cool Comfort

SALESMAN'S HANDBOOK

The Sub-committee on Electrical Salesman's Handbook has issued during the year the following material:

Heating Section	24 pages
Power Section	Pages 123 to 140, inclusive, relating to electric elevators
Power Section, Appendix No. 1, Steam Data	46 pages
1 Errata sheet	

The fourth issue under preparation at the time of writing this report consists of additional matter for the Illumination Section.

Catalogue sheets for use in connection with the Handbook have been furnished by manufacturers as follows:

Bissell Motor Co.	9	pages
The J. H. Day Co.	8	"
General Electric Co.	26	"
Metropolitan Engineering Co.	26	"
Palmer Elec. & Mfg. Co.	20	"
Westinghouse Elec. & Mfg. Co.	35	"

To provide for increased membership in the Commercial Section a second edition of the Handbook consisting of 2000 complete copies has been prepared.

The Committee has on hand for future issues a large amount of material for the power and heating sections as well as the promise of additional information and data for the Electric Vehicle Section.

It is the sense of the Committee that the next issue should consist of such material as is made available through the reports submitted to the Commercial Section at the San Francisco Convention, with special reference to material relating to merchandising and appliance sales.

The Committee feels that there has been a lack of expression upon the part of those who use the Handbook, along the lines of constructive criticism and suggestions relating to its future development. It is their earnest hope that such expression will be forthcoming, volunteered by those present at the convention and through correspondence from those who really use the Handbook, which may serve as a guide in the future development of the *Electrical Salesman's Handbook.*

CONCLUSION

During the last two years the publications of the Commercial Section have been purchased by upwards of two hundred Class A member companies, representing about 18 per cent of the total Class A membership. This figure does not include the names of those ordering less than ten copies of any one publication, nor does it include those purchasing sets of the Handbook. The number of smaller companies placing orders for our publications is steadily increasing and fifty-three new customers were secured solely through the medium of the campaign on the *Gifts That Please* booklet. Your Committee, however, is far from satisfied with the results obtained thus far and is pledged to a still more aggressive policy for the ensuing year.

Your Committee has asked itself the question "Why are 82 per cent of our Class A members not buying the Commercial Section's publications?" These booklets and campaigns have been prepared by men of unquestioned ability in their respective lines, and the fact that our 200 customers include the most up-to-date central station companies in the industry, both large and small, justifies us in the belief that our booklets and campaigns compare very favorably with any similar literature which may be purchased elsewhere. After a careful consideration of the facts, your Committee has reached the conclusion that this condition is caused by the following reasons, which apply principally to the smaller companies:

(1) Wide-spread indifference to manifest opportunities for obtaining new business.

(2) An equally wide-spread belief that no other publicity is needed than that obtained from the booklets and folders furnished gratuitously by manufacturers who take this means of boosting the sale of their own wares.

(3) Failure on the part of many companies to maintain a comprehensive list of prospects in their territories or to provide adequate organization for conducting follow-up campaigns.

(4) In many cases a policy of retrenchment that seems to go to unnecessary extremes; in some cases an actual lack of funds.

(5) Failure on the part of many companies to realize that on existing service lines without capital investment except for the cost of installing service, there is a vast amount of potential business which can be converted into actual revenue upon the application of suitable advertising and follow-up campaigns, the expense of which can be met out of the first few months' revenue. The import of this consideration should be most appreciated in

times like the present, when new capital may be difficult to raise, and when it is important to earn the maximum return on existing capital investment.

Many influences are already at work to correct these conditions and your Committee believes that with the steady development of its educational propaganda the percentages above quoted will be ultimately reversed. So long as there appears to be a legitimate and increasing demand for these publications, as indicated by the analysis of sales presented herewith, your Committee recommends that the Commercial Section continue its activities in this field, or until it can be demonstrated that more important and more constructive work can be accomplished through other channels.

E A Edkins, *Chairman,*
H K Mohr, *Vice-Chairman*
N H Boynton, *Sales Manager*
H W Alexander
F H Gale
D H Howard
H N McConnell
J C McQuiston
P L Miles
Cyril Nast
F D Pembleton
P L Thomson

NUMBER OF PIECES HANDLED AND REVENUE FROM SALES

	1912			1913			1914			Jan & Feb 1915			TOTAL		
	No. of Pieces		Billed Amount	No. of Pieces		Billed Amount	No. of Pieces		Billed Amount	No. of Pieces		Billed Amount	No. of Pieces		Billed Amount
	Gratis	Sold		Gratis	Sold		Gratis	Sold		Gratis	Sold		Gratis	Sold	
Binders	-	288	$209.25	3	559	$423.38	3	110	$92.65	-	14	$11.90	6	971	$737.18
Digest	-	435	331.25	-	-	-	-	-	-	-	-	-	-	435	331.25
Industrial Lighting	-	15,997	1,662.55	413	2,714	268.80	60	4,457	445.75	-	-	-	473	23,168	2,377.10
Ornamental Street Lighting	-	4,554	630.65	446	1,471	109.35	261	230	44.60	-	5	1.00	707	6,260	785.60
Electric Service	-	62,355	1,888.40	960	68,522	2,082.85	850	16,981	497.55	-	-	-	1,810	147,858	4,468.80
Electrical Equipment	-	25,572	1,099.90	433	7,866	473.40	56	1,500	125.50	-	-	-	489	34,938	1,698.80
Home Thoughts	-	-	-	1,075	54,110	1,557.55	1,054	35,281	1,044.05	-	-	-	2,129	89,391	2,701.60
Store Service	-	-	-	1,438	23,787	744.85	1,985	13,042	420.60	-	-	-	3,423	36,829	1,165.45
Farm Help	-	-	-	421	-	-	212	448	44.80	-	-	-	633	448	44.80
Church Lighting	-	-	-	16	4,691	420.92	249	2,245	227.40	-	6	.72	265	6,942	649.04
Solicitors Handbook	-	-	-	16	17	17.00	312	54	44.00	-	4	4.00	328	75	65.00
Original and 1st Quarter	-	-	-	252	1	3.00	-	-	-	-	-	-	252	1	3.00
1st Quarter	-	-	-	1,259	1	.33	1	1	1.88	-	-	-	1,260	2	2.21
2nd "	-	-	-	1,531	3	2.58	16	4	7.48	-	-	-	1,547	7	10.06
3rd "	-	-	-	1,263	3	2.59	21	4	7.48	-	-	-	1,284	7	10.07
4th "	-	-	-	1,313	2	2.25	21	4	7.52	-	-	-	1,334	6	9.77
6th Issue	-	-	-	1,312	-	-	26	3	5.64	-	-	-	1,338	3	5.64
Complete Handbook	-	-	-	174	19	55.00	-	-	-	-	-	-	174	19	55.00
Electrical Salesmen's Handbook (Case and Binder)	-	-	-	-	-	-	1,510	107	387.50	5	13	32.50	1,515	120	420.00
Electrical Salesmen's Handbook (Case)	-	-	-	-	-	-	-	1	1.65	-	-	-	-	1	1.65
Residence Service Campaign	-	-	-	-	-	-	-	337,925	6,977.44	-	-	-	-	337,925	6,977.44
Christmas Booklets	-	-	-	-	-	-	-	122,500	1,998.50	-	8,250	131.25	-	130,750	2,129.75
Miscellaneous	-	-	-	-	-	-	-	-	14.87	-	-	35.00	-	-	49.87
Cushing's Manual	-	-	-	-	-	-	-	-	-	-	1,452	1,173.15	-	1,452	1,173.15
Miscellaneous Publications	-	-	-	-	-	-	-	-	-	10	1	.75	10	1	.75
Total	-	109,201	$5,822.00	12,325	163,866	$6,263.85	6,637	534,797	$12,396.86	15	9,745	$1,390.27	18,977	817,609	$25,872.98

MR. EDKINS (continuing): This report was turned in to the Secretary of the Association on March 23rd. It may be interesting to the members present to know that the figures have been revised up to the 1st of June, and the result of the tabulation, showing the number of copies sold by years, is as follows:

In 1912 we sold 109 000 copies, in round numbers. Revenue, $5,822. Next year, 1913, we sold 164 000; revenue, $6,263. In 1914 we jumped from 164 000 to approximately 535 000. I wish to draw attention to the fact that this was during the year of a very severe business depression all over the country. Our revenue from the sale of these publications last year increased from that of the preceding year, $6,200, up to $12,396. This year, up to the 1st of June, we had disposed of 14 000 copies, and the income from sales amounts to $1,653.

It should be noted that the large number of copies sold in 1914 is based upon the thirteen separate pieces of printed matter in the form of booklets and folders, comprising the Residence Service Campaign. It would hardly be fair to figure the number of copies sold as equivalent to the number of sets sold. We are still selling the individual units of that Campaign. This brings the grand total of the number of copies sold during the last three and a half years up to 822 000 copies, and the total income to $30,836. That is the only change that I have to note in the report.

I have here a letter from Mr. C. J. Russell, which is really the report on the *Salesman's Handbook* and is to be included in my report. This will be of interest to the meeting. It is addressed to Mr. Tweedy, Vice-Chairman of the Handbook Committee:

REPORT OF SUB-COMMITTEE ON THE SALESMAN'S HANDBOOK

For your information I beg to advise you that on May 20th a meeting of the illuminating engineering members of the *Salesman's Handbook* Committee was held in New York, and that approximately 60 pages of aggregated and additional material for the Illumination Section were finally passed upon and taken in hand by Mr. M. S. Seelman, Jr., for final editing and printing. If it be possible to prepare 20 pages of additional material upon timely topics relating to illumination in time these will be included with the coming issue.

This issue consists entirely of illumination material and is intended to cover all suggestions that have been made, with the exception of an actual revision of an extensive nature, which was not considered for the reason that out of the second edition of 2000 handbooks, 1529 had been ordered on May 20th. From these figures it is evident that a third edition of the handbook will probably be necessary within a very short time, and it is the thought of the Ilumination Section of the Handbook Committee that an extensive revision will be necessary when this third edition is prepared, particularly on account of the changing efficiencies in mazda lamps.

The present issue practically completes the work of the present Committee and the Chairman desires to convey his thanks for the interest and support given by each member of the Committee.

Yours very truly,

C J RUSSELL, *for the Committee*
S E DOANE
G H JONES
NORMAN MACBETH
M S SEELMAN
C H STEVENS
G H STICKNEY

CHAIRMAN BURNETT: This most interesting report is now before you. We have many of these publications on exhibition in an adjoining room on this floor.

DISCUSSION

Mr. T. I. Jones, Brooklyn: I merely want to say, Mr. Chairman, that oftentimes this report of the Publications Committee is a fifteen-day wonder, and then dies. One of the particular points that Mr. Edkins brings out, and one that should interest all of you, is the Residential Campaign proposition that is outlined in pamphlet form, and ready for your inspection in the room to which the Chairman has just called your attention. It is a campaign that has required months of careful work by your Publications Committee. It was prepared by some of the best advertising men in the industry, and is a campaign that can be used either individually, or collectively, by every station manager. It is a complete sales' campaign, a complete silent salesman, if you please to call it such, for the good of the business. It is worth more than the passing notice given to it in Mr. Edkins' report. If it means anything at all, it means the advancement of the business of every delegate here. Take time to look at this Residential Campaign, if at nothing else the Publications Committee has put out.

Mr. Frank H. Gale, Schenectady: I heartily endorse Mr. Jones' remarks on this campaign that the Publications Bureau has arranged for the benefit of the members. I have the feeling that there are a great many of our members who do not realize the tremendous value of the printed matter and the specific campaigns that have been laid out and put in workable form by this Committee.

At previous conventions suggestions have been made from the floor by the delegates that the Committee was very glad to incorporate in its subsequent efforts. Speaking for the Committee, I am sure that suggestions of that kind will be welcome here.

I think there is no other industry in the world for which a campaign as comprehensive as this has been planned. It deserves from the members of the Association a support a great deal more hearty than it has received. I say this, not to be critical, but simply to point out that I believe the members do not appreciate the fact that this is something very unusual. Things go along in such a natural way with this Committee under Mr. Edkins' very efficient direction, that the members take results as a matter of course, whereas, they are of unusual value, and an important addition to the material available for central station publicity work.

Chairman Burnett: I would like to say from my own experience that the work of this committee is most interesting, and any one who has had anything whatever to do with the Committee in the way of preparing this matter gets very enthusiastic about it.

I think it would be well at this point to hear from some of the men present who have used this Campaign.

Mr. Learned: I sometimes think that the publications put out by the Committee are like our efforts to get new members. We go out and solicit people to buy these publications just as we solicit membership in the Commercial Section. If we were to put it up to central station men that this is their last opportunity to get the only publication on the market, they would be lined up to get it.

I know whereof I speak when I say that it is of considerable value. We make a specialty of house wiring. We make a campaign for house wiring just the same as we would if we were selling merchandise. We have that backed up by the wise distribution of booklets and the other literature that is shown in the campaign dummy.

It may interest you to know that about seven years ago we started out with some 6500 prospects. These prospects were residences adjacent to our lines. During the last few years we have wired on an average of 1400 or 1500 houses a year, and, strange as it may seem, we now have a list of about 9500 prospects. This year we have already wired 80 per cent as many houses as we did during the entire year 1914. We attribute our success in a large measure to these publications.

Mr. Jones: As I do not think most of us here know what we are talking about when we speak of this Residential Campaign, I want to go into detail. Here is the campaign shown in this booklet. There are thirteen different sets of cards. For instance, one on "Fan Comfort;" then another on how to equip your home with various wiring devices; there is a letter which deals with the Fall season; there is a second follow-up letter; there is another form of appliance. These are all complete letters.

Mr. Edkins: We sold about 30 000 of those last summer.

Mr. Jones: There are not more than a hundred or so of the sample "dummies" now available. The point is this: You can use the complete set of thirteen, or certain combinations of them, as they may suit your local conditions. There is a complete list of them here in the Campaign. If there is anything at all in it that will be of value to you it can be purchased alone or you can make use of the whole thirteen. You can also order any number of any particular kind.

MR. GIBBS: I have talked a good many times just as enthusiastically as I possibly could on the value of the various publications that the Commercial Section issues. The Residence Service Campaign, complete, is certainly a marvel. That sort of a campaign has been prepared before under various circumstances, but with regard to the publications issued by the advertising agencies, I have never seen one that equals this one. While enough has been said perhaps as to the merits of the set itself, the interesting point, it seems to me, is whether you can use it. In the New England Section of the Association, orders have been taken for even as few as 30 complete sets and from that up to 3500 sets. As to some of the booklets we, in the Boston Edison Company, have used 10 000 to 15 000. This shows that they are entirely adaptable to the smallest as well as the largest communities. In the small towns where only a few of the sets were taken, a point was made of sending them out with the bills at the end of each month. I know that in the case of an order for 30 in the town of Chester, the man who is everything in the station, who is the central station, enclosed the booklets in letters, and the reply cards with the bills. He waited a couple of days so as to be sure that all of his customers had got their bills and letters, and then began to call them up. To some he would say: "How do you do, Mr. Smith. You got your bill all right this month, did you?" Mr. Smith would answer "Yes, why?" with a snap in his voice, as much as to say, "Do you want your money right off." "Well, I intended to enclose a little booklet with that, and I am not quite sure whether I did or not." "Oh, yes, I got the booklet." "I am very glad you did, I was interested in having you see it."

Well, of course, Mr. Smith hung up the telephone and then when he went home, said to his wife, "Did you get a little booklet with the bill?" "Yes, I got it and laid it over here. It looked kind of good to me and I thought I would read it when I got a little time." Anyway, Mr. Smith hunted up the booklet and looked it through.

The central station man went through his entire list of customers by telephone in that way. You cannot do it with 100 000 customers, but you can do it very well wlth 45 or even 300. You can do that very easily. Advertising matter of this kind is of very great value if some personal attention goes with it. The Association takes you into membership but it cannot put the breath of successful business into your affairs unless you help, unless you do a large part of the work, and these folders, it seems to me, are of value in making your work easier. They are just like an extra man on your sales force, and at a very small cost per month.

I would like to say a word on the possibilities of the Store Service Campaign. The Committee has been at work for some months preparing this. It is barely possible that some of the central station men have now only a dozen stores in their territory which have not yielded to persuasion and taken electric service. Whether it is a dozen or 10 000, a Store Service Campaign will be available and will be a very valuable help. It simply brings in a new line of arguments for these men.

There are stores in every central station territory that have not been signed up. They will not come in. There is a discouraging feeling that no argument can move them, but by pursuing the lines mapped out by the Committee, the chances are improved that you may get them.

Please keep in mind, gentlemen, when you are talking with other men about this matter, that the Commercial Section is not trying to push these things for its own profit. You go yourselves, sometimes, to customers whom you know you could save money for if they would sign up with you. They will not do it because they do not understand that you are trying to do something for them that is of real value, and that is going to be a real benefit to them.

I think that we, in our Section, should, so far as we can, rely upon each other, in the mutual feeling that no one is trying to sell something for profit, but it stands to reason that the usefulness of the Commercial Section depends on the amount and extent to which you invest in it and its products.

MR. M. C. OSBORN, Spokane: It is very entertaining to listen to the different members regarding the distribution of these publications, but it appears to me that there is a start and a finish to this proposition. Mr. Learned has told us that he now has 9500 prospects. It would be interesting to know how he secured those prospects, and also how he finished wiring the houses, whether he did the wiring himself, or whether he sublet it to outside contractors. That is perhaps not so far beside the question, for I really believe if he would tell us it might lead up to the sale of a number of publications for this class of work. Outlining my ideas of this, I might explain that in Spokane during the last two years we have by personal solicitation secured something over 2000 house-wiring contracts on the present line. Spokane has the reputation of having more residential consumers in proportion to the whole than any other central station in the United States. As I say, we secured these contracts by personal solicitation, and we sublet the contracts to different house wiremen, jobbers, and so forth, giving them 20 per cent down, and 25 per cent per month. Our credit department reports were first class.

Mr. Learned: It is assumed that the central station company has made a very careful analysis of its market before it thinks of buying any of these publications. I take it that there are certain sections of the country where it is not necessary to make a very vigorous campaign on house wiring. That situation exists in the West because electric service came first, and then gas; but in the middle West, and in the East, the conditions are reversed. In our own territory we first made an analysis of our prospects by having salesmen canvass the entire residence territory carefully, in order that we might get the names and addresses of prospects whose houses were adjacent to our lines.

The first canvass took in those houses that were owned by the occupants. We had 6500. We have been wiring in the last five years on an average of 1400 houses a year. It seems rather strange that now, having done all of this business, we have a list of 9500 prospects. I think that came about through the three canvasses made of the territory. The salesmen in the first canvass would hesitate about putting on the list those houses that did not look very prosperous. We have since gone into the matter exhaustively and we have now a complete list of all our prospects. It was rather expensive, this canvass, but it has been well worth while. Central station companies that have not yet made a complete analysis of their territory, so far as the residence business is concerned, ought to do it, because they will find it worth while.

As to the wiring, in some instances we do it ourselves, and in others we are obliged to sublet it to contractors. They are very active. They get out and make a campaign and pick up a lot of business. In some parts of our territory we handle all of the wiring. One feature in connection with our wiring is that we do it on the 24 monthly payments plan, and in those cases where the contractor does the wiring, we buy the contract from him if he secures it. If we secure it, we sublet it to him at 10 per cent reduction on the contract price.

MR. N. H. BOYNTON, Cleveland: I want to point out one thing that has not been covered. It is much more to our credit to adapt this stock advertising, if you choose to call it such, to our own particular requirements, than it is to originate, or spend money in originating, individual advertising forms. The effort which would be required to write a booklet or folder, or a letter for yourself individually, would be far more productive if spent in localizing the publications that are offered by the Commercial Section.

In regard to the Store Service Campaign, it is brand new, it is being shown for the first time this week. There are copies on display in the adjoining room, and in connection with this campaign there have been no plates made. The copy is still in type. If you have suggestions as to changes in the copy, we shall be very glad to have them, because we could adopt your suggestions, and thereby make the material better for your own use. Step into the exhibit room and look over the samples; then if you have any orders to give let us take them.

CHAIRMAN BURNETT: There is one phase of this subject that we are very likely to overlook in connection with the printed matter of our Publications Committee. That is the method of dealing with houses that are wired but are not using the service. Occasionally our companies get busy with such houses, but the majority of us, I fear, overlook them. The Baltimore Company, with which I am connected, has made a canvass of both these and the houses piped for gas service, with most gratifying results. In my opinion houses of that character should receive the same attention in our circulars as houses that are not wired or piped at all.

We are here in this convention to get all the benefit we can. If, when we go home, we analyze our local situations to find out just what buildings, both residences and stores, are wired and not taking the service, and then begin to use the Committee booklets to work up an interest on the part of the building owner or occupant, we will benefit by it. I should not be at all surprised if from the representatives in this room we got several thousand customers who are now lying dormant.

I might take just another minute to refer to a method of the Baltimore Company which has been spoken of before in this convention. We do not make a practice of cutting out the service when the tenant or occupant of a house moves. We leave the equipment in with the current on. In a residence we attach a tag to the hall fixture which gives the identifying number on the company ledger, and the tag contains a request that whoever moves in shall just put his name on the dotted line, affix a one-cent stamp, and mail the blank to us. We find that the number of cases a year in which the current is used and the bill not paid is so small, and the amount of the current consumed so very negligible that they need not be considered as compared with the advantages of having the service left alive.

Repeatedly, people have come to us and expressed their appreciation of our thought and consideration for them in leaving the service ready to use, so that they could turn the light on when they moved in. I find that when people realize that we are considering their interests as well as our own they reciprocate by promptly sending word that they have taken the premises and will be responsible for the amount of current used. The reason I speak of these things is that they must be considered in our work. These are things that make our commercial work successful, things that are practical aids and help us in our daily work. They contribute to the success of our companies and our Association.

MR. J. A. MOSELEY, Corsicana, Texas: I would like to ask what success you have had with those cards.

CHAIRMAN BURNETT: In a majority of cases they are sent in.

I might add a little side remark with reference to gas. In Baltimore we once had a practice of putting a cast-iron lock over the service cock. That meant that a man would have to go out either on a motorcycle or in a wagon, on account of the supplies that he had to carry with him, and put on the cast-iron lock. We had such success in the electric end of the problem that we now handle the gas by simply using the usual meter seal that closes off the gas. We do not put on the protector. We have always felt that it was more or less an affront to our customers to treat them as though we expected them to steal from us. We, of course, do not leave the gas service turned on, because of the danger of fixtures being taken down, gas leaks, and so forth, which might cause fires or explosions. We do everything we can to make our service available to people when they move in, so they can begin to use light at once without any mechanical trouble. That practice is merely suggested to you for your consideration, as one of the various ways by which you can get more business, and to help you in your dealings with the public.

MR. WALTON: I am interested in what the Chairman has said about leaving the electric current on. How long it is before somebody gets around there to read the meter, in case the notice card is not sent in. How much of a bill does the consumer run up before you find you have one.

CHAIRMAN BURNETT: That depends upon the locality. In Baltimore we have a pretty large proportion of the population. The meter reading slip is left in its place. The meter reader steps in and takes the reading———"

MR. JONES: He has got to get inside to read the meter, has he not?

CHAIRMAN BURNETT: We have left the service on in this way for varying periods. We started with three months and found it worked so well that we increased the period to six months, then to nine months for a little while, and then we thought we would save some money by letting it go entirely. We let the matter run on until we found we were in need of a considerable number of meters, when we made a clean-up. We have confidence in the method, and in the large majority of cases the service comes into use again in the course of a few months.

MR. F. D. BAKER, San Francisco: A question I want to ask is, do you require a deposit from your customers when they are not property owners? How do you arrange that. Do you require contracts from all of them?

CHAIRMAN BURNETT: In a case where the hall tag is signed, the card is accepted as the equivalent of an application. Under our Public Service Commission we can charge but one rate. Upon receipt of that card by us the customer is put on a certain schedule. Deposits are asked for only in cases of doubtful credit. We have some 40 000 customers, and about 600 deposits, some small number like that. The credit of each customer is known, after investigation.

Mr. F. R. Lewis, San Francisco: Not being acquainted with your power companies in the East, I would ask you if it is not a fact that you have no competition in the city of Baltimore?

Chairman Burnett: That is correct; we have none.

Mr. Learned: I move the report of the Publications Committee be accepted.

(Motion seconded and carried)

Chairman Burnett: We will proceed to the report of the Committee on Education of Salesmen, F. R. Jenkins of the Chicago Central Station Institute, Chairman.

REPORT OF COMMITTEE ON EDUCATION OF SALESMEN

Following upon the appointment of the Committee on Education of Salesmen for 1915, they reviewed the two previous reports of this Committee together with their recommendations.

The need for a thoroughly organized campaign for the education of salesmen and for keeping them up to date, was shown in the previous reports, and the great interest in educational methods as used by a few of the larger companies convinced your Committee that practical means should be devised for accomplishing this purpose.

Early in December the attention of the Chairman of the Commercial Section was called to this demand by central station companies for some organized method of conducting an educational campaign among the salesmen in the commercial departments of member companies, principally among those smaller companies unable to obtain the advantages of an organized educational department, owing to the large expense involved.

These facts, together with the recommendations of the two previous Committees, that the Commercial Section authorize the publishing of a course suitable for central station salesmen, to be conducted by correspondence, was brought before the Executive Committee of the Commercial Section and received its general approval at a meeting on December 14th, and your Committee was requested to prepare such a course.

At a subsequent meeting the Committee prepared and submitted to the Executive Committee of the Section an outline of three courses, which preliminary report receiving their approval, was submitted to the Main Executive Committee for its approval at the meeting of January 8th. This endorsement was given and the Committee was directed to proceed along the lines indicated in its preliminary report, and to co-operate with other Associations conducting courses along these lines.

At a meeting in Pittsburgh on March 2nd, your Committee selected and arranged the course outlined later in this report.

We wish to call the attention of the member companies particularly to the advantages of the methods suggested for use in organizing and conducting the classes, as the co-operation asked of the companies will result in a large enrollment with the best possible results, and will insure the financial support necessary for properly conducting and publishing the course.

Last month a copy of the prospectus outlining this course was mailed to all Class A and Class B members of the Association. To Class A members there was mailed also a special letter asking that this prospectus be called to the attention of the head of the department whose men would be most benefited by enrollment, and that he sign a return card, which was enclosed, asking for further information and agreeing to place this matter properly before his men, and to appoint a class leader to assist in organizing and conducting the class. The name of this class leader was to be sent in to the Association, and he was to receive further information to assist him in his work.

This method of introducing the course has proved very satisfactory, but there are still a large number of member companies that have not yet reported, and, it must be inferred, are not actively engaged in the organization of classes.

It is intended that each subscriber to the course shall receive one lesson each month, and shall give his individual study to this lesson, in addition to which, he shall be a member of the company class, which will set aside once each month, sufficient time to take up and thoroughly discuss all questions pertaining to the lesson under the direction of the class leader, together with the head of the department, the work of which is under discussion at the time.

By this method of correspondence, supplemented by individual work in the classroom, the Committee hopes that the best results will be obtained.

The prospectus of the course, which is respectfully submitted by your Committee for the consideration of the members of this Association, is printed in a separate pamphlet distributed at this Convention.

Your Committee has received the co-operation and encouragement of all members of the Association to whom it has applied for advice and assistance, and we believe that we can assure those who enroll in this course that they will receive in the lesson subjects outlined information of permanent value, prepared by men who are specialists in their line of work and who are actuated only by the desire to further the interests of the Association.

The Committee extends its thanks for assistance rendered by members of the Association, and also to the National Commercial Gas Association which is conducting courses along similar lines.

FRED R JENKINS, *Chairman*
R H BALLARD
J F BECKER
JOHN A BRITTON
DOUGLASS BURNETT
A C EINSTEIN
T P GAYLORD
C A S HOWLETT
J D ISRAEL
M S SEELMAN
W M SKIFF

CHAIRMAN BURNETT: This report is before you. I would like to have it very fully discussed. This represents quite a departure in advanced work for our Section. I see that Mr. Gilchrist, who is Chairman of our General Committee on Education is in the room. He undoubtedly has some views on this subject, and we would like to hear from him, if he is willing to talk to us about it.

DISCUSSION

MR. JOHN F. GILCHRIST, Chicago: I thank you for calling on me. I came up here to discuss this report, and this gives me the opening I am looking for. I feel that we have all, during the last three or four years, had our attention fixed on the desirability of some educational measures to cover all of our men. In this industry the manufacturing companies saw the advantages of such a measure long before the central stations did. It has been their practice, as you know, to watch the graduating classes, and the lower classes, as well, in a great many of our big educational institutions with the idea of securing the men considered the ablest. This year, I think, has made an exception, very naturally, in the number of opportunities which have presented themselves to students, but either last year or the year before, Dr. Shepardson, head of the Engineering School of the University of Minnesota, told me that he had 50 men in his graduating class of engineering students, and 55 applications for good men, so his men apparently had a choice of positions. That simply shows the attention which is being given by the officers of our companies in our industries, to getting men who are sufficiently trained.

I think the New York Edison Company was one of the pioneers among central stations in the idea of establishing classes and educating its own men. It has carried that work out consistently. Some other Edison companies, a year or two ago, did a little work along that line. This plan of the Commercial Section to establish a standardized course available to all members, and to be secured by students at a minimum of expense, is a very desirable move. We can not expect to get the first year a course that will be entirely satisfactory; it will undoubtedly be an evolution, and each year improvements will be made. When we come together six, eight or ten years from now, I have not the slightest doubt that these educational courses will be established as regular functions of this Association, and very important ones at that, and we will be surprised ourselves to realize how complete our courses and how thorough the text books are.

We, in this industry, are moving so rapidly that if we want to get the last word on any subject we have got to go to the men who are engaged in the work. Most of the text books of to-day are based on practices of five, six or eight years back. The book that is written this year will be rather out of date next year, so that it will be a case of continually keeping the course up to a high standard.

If this Association will come forward as the Commercial Gas Association has done, in support of the scheme, there will be no criticism whatever, and certainly the electrical people can get up and support just as good a scheme as the Gas Association has evolved.

MR. R. S. ORR, Pittsburgh: I had not intended to discuss this paper, but I do want to say that I am heartily in sympathy with the movement to train and educate our employees. I think Mr. Gilchrist hit the nail on the head when he said that our industry is advancing so rapidly, that the only way to keep up with it is to develop the young men, and give them their training by the side of the men who are actually doing the work and making the progress.

I think, so far as the operating end of the central station companies is concerned, that we can get men equipped to do that work more easily than we can get eager and accomplished salesmen, particularly in the power department. I would be very much pleased, if the Commercial Section, in its course of training, would keep that thought in mind, and give us training that will develop especially good power salesmen. Just how that is to be accomplished I do not know. I have no ideas on the subject, but I feel very confident that it is in good hands.

MR. CALLAHAN: I think there are some here who have felt that reports of the Committees on the education of salesmen have dealt mainly with the conditions and requirements of the larger member companies. It is true that changes in salesmen are more frequently made in the sales organizations of the larger companies than by the small companies, but now with this educational course we have something surely of practical value to the employees of the small as well as the large member companies. The large companies, of necessity, have their own training schools. The courses, however, have been arranged to particularly meet the requirements of salesmen or prospective salesmen employed by the small companies. The Commercial Section and particularly the Committee handling the course are only too glad to supplement this and give member companies assistance from time to time, which will surely result in great benefit to them.

I think we have made very marked progress this year and congratulate the Committee on presenting its report in the shape of a Commercial Section Educational Course actually launched, with already a large number of companies and individuals enrolled.

MR. R. R. YOUNG, Newark: Our Company has had considerable experience with the educational course of the National Commercial Gas Association. We started in this work about three years ago with a small membership, and last year we had an enrollment of 826 men.

It is very important to have a class leader to whom the men can refer, and who will keep up the interest in the work. This was proved out by our first year's experience when the men were left to their own resources. The last two years a leader has been appointed for each class in our various offices, and an afternoon each month has been given, in the Company's time, to going over the lesson.

We find that our men are becoming more interested in this work every year, as we have had not only salesmen but bookkeepers, collectors, and fitters from the operating department join the classes. In the class that closed two months ago two firemen from the operating department were graduated and received their diplomas.

We, therefore, want to impress on all our employees, whether they are in the sales department or other departments, the advantages of taking this course, as it will further not only the company's interests but their own.

MR. S. M. KENNEDY, Los Angeles: I agree with Mr. Young. A course of this character is one that should apply to all the employees connected with any central station company. I am sure such a course would be fully as beneficial to the small companies as the larger companies. In the Southern California Edison Company we have had courses something like this during the past year. Meetings are held every Monday morning on the company's time. A great many topics are brought up and discussed. We find these meetings to be of great benefit to all our men, and that many of the younger men from the other departments are looking toward the commercial side of the business. They seem to feel that the opportunity for personal advancement is along commercial lines. For that reason the younger men with ambition and enthusiasm are endeavoring to assimilate as much as they can pick up concerning the commercial side of the business, in addition to the duties connected with their particular branches of the work. This course will certainly have a tendency to lift all the branches of our industry. The ambitious younger men in other departments may learn what they need to know, for the purpose of advancing. If the heads of commercial departments in our organization throughout the United States will put a little enthusiasm behind this course of study and bring it to the attention of their associates, it will be of great benefit to each and every company that takes it up and gives to its employees the opportunity to help themselves.

MR. H. P. PITTS, San Francisco: I have not had an opportunity to look into this matter at all, but I feel that if it is being carried on by the National Association it will be all right. I think it is a good thing for the large companies as well as the small companies. Our experience in San Francisco has been that we have had no organized system of teaching our salesmen. We have not had class leaders. The result has been that even with lectures and other methods of training the men, there has been a general lack of organization. Certainly this system should meet with as much success as the International Correspondence Schools. There is no reason why we in the electrical business should not develop our young men just as well as the correspondence schools throughout this country are developing the young men who take their courses to-day.

I remember at a convention in Atlanta, that this subject was brought up and a delegate from a small company said, "How are we small companies going to carry out this plan that you larger companies have established?" I think that question has been answered. A way has been found. Do not forget the class leader. Unless you have a leader you will not make a success of any home correspondence course.

MR. F. A. LEACH, JR., Oakland, Cal.: The matter of educating our men in the Commercial Department has received considerable attention in my district. We hold Monday morning meetings of about two hours, on the company's time, for all men in our Commercial Department. The educational features consist of lectures by men who are recognized authorities in their different lines. We have taken up not only electrical generation and distribution but also gas manufacturing and distribution, and the application of the different appliances to the consumer's wants. We have drawn upon our own engineering forces as well as the forces of the different companies handling apparatus.

I was very much pleased with Mr. Kennedy's remarks concerning the advisability of letting the boys who are ambitious and energetic have white shirt jobs. One of the strongest features of our National Electric Light Association section work should be a system of advancement, so that any man in the employ of the company, no matter how he comes in, is eligible to a better job if he can prove to the satisfaction of those in charge that he is worthy of it.

MR. YOUNG: There is one other very important point in our work that I neglected to mention. We give our employees an opportunity to take this course on an easy installment plan. In the National Commercial Gas Association educational course our Company paid the subscription price of $5 for each man and allowed him to pay this back in installments of 50 cents per month.

This year the Gas Association has extended its course to cover a wider range of subjects over a three-year period, the cash payment being $25. If there is any man in our Company unable to pay this amount the Company will advance the money and accept installment payments of $1 per month.

Some plan of this kind is essential if the National Electric Light Association wishes a large enrollment. There are a number of employees in every company whose salaries are small, to whom $16 would seem a large amount even in quarterly payments. I would, therefore, suggest that member companies make it as easy for their men as possible by a liberal time payment plan.

MR. R. H. BALLARD, Los Angeles: While I was a member of the Committee that prepared the report, my work in connection with it was at long distance, I feel that the work of this Committee is along the right line, following out and perfecting a more or less disorganized effort to present an educational feature to salesmen.

The point that Mr. Young brought out as to ease of payments I consider a very important one, on the ground that while those who get things for nothing usually do not appreciate their full value, still there are some men in every organization whose salaries are so small and whose burdens are so heavy that they could not undertake the extra expense. The course pursued by Mr. Young's company seems to meet both of those conditions.

MR. R. LOUIS LLOYD, Philadelphia: It may be of interest to this meeting to know that we have started a course in Philadelphia, beginning a little bit lower down than the course indicated here. We have begun a course so simple that even the office boys are invited to join and take up the study of arithmetic and algebra and thus work on up into the higher branches of the subject of salesmanship. Of course, that cannot all be accomplished in one season. The enthusiasm which is shown by these young fellows is just as was pointed out to you by Mr. Kennedy, and they look to the Commercial work as a step in the right direction. The outlook is very encouraging. They devote their evening time to it, and there has been no charge made for any of the courses.

MR. OSBORN: Somebody has mentioned here that the employees meet every Monday morning. I cannot understand how you can have any organization of your salesmen without meeting them every day. We in our Company meet every morning from a quarter past eight to nine o'clock. We talk on the subject of the sales of electric current for three-quarters of an hour or so, but there is always something new and entertaining in it. We invite the members of the other departments to come in. I believe, also, in having class leadership.

Mr. Gilchrist, in his remarks, mentioned the fact that we are educating the other fellow. I approve heartily of the effort to induce our universities and colleges to work with us, particularly in our lines. I know that our company would be very glad to pay tuition fees for some of our men, if colleges courses were taken in our practical way. These tuition fees could be repaid later on.

MR. H. W. EDDY, Chicago: An educational course of this sort would give a man in the field an opportunity to go right out and do or try to do the things that he has been learning from the instructors. Such an opportunity you do not have in any other course of education. You are dealing with abstract matters. You could take this course, and could go right on with your work. You would be learning something all the time as you went along, and applying your learning to your work. In addition to this, many ideas for new business would be caught, so that aside from the value of the training to the man, it will certainly bring an increase of business to the company, and every salesman ought to participate in this course.

MR. JENKINS: In the letter to the Class A members we enclosed a return card, which stated that the Company was interested and would take the matter up and pass the prospectus along to the head of the department, who would sign the card and return it to us. That is a method that has proved to be very satisfactory, but we have not as yet received enough cards to satisfy us. In the Exposition room we have copies of these cards, together with our literature, and I wish you would avail yourselves of the opportunity to get them. The intention is to add a class during July and August. It is also our intention to start a course next fall, probably October first. The point that I would like to emphasize the most is that we should all get busy right away with our enrollment, so that we may have some concrete facts on which to figure. Do not wait until next August or September to form your classes. Do something and do it now, so that we can know what we have to meet.

CHAIRMAN BURNETT: Do you wish to accept the report and have it printed? A motion to that effect will be in order.

(Motion made, seconded and carried)

I am very glad to see the enthusiastic attention that is being paid to our work here. There are now fifteen per cent more people in this room than were here when we began this session.

I want to call your attention to the following statement on page 25 of the Publications Committee report:

"The Committee feels that there has been a lack of expression upon the part of those who use the *Handbook,* along the lines of constructive criticism, and suggestions relating to its future development. It is its earnest hope that such expression will be forthcoming, volunteered by those present at the convention and through correspondence from those who really use the *Handbook,* which may serve as a guide in the future development in the *Electrical Salesman's Handbook.*"

We have twenty minutes in which this subject may be discussed, if you care to take it up. If there is to be no discussion, I will call upon Mr. Learned to present the report of the Committee on Commercial Department Terminology, in the absence of Mr. M. E. Turner of Cleveland, Ohio, the Chairman.

REPORT OF COMMITTEE ON COMMERCIAL DEPARTMENT TERMINOLOGY

At the Philadelphia Convention of the National Electric Light Association, in 1914, the Commercial Section adopted a resolution to appoint a committee to standardize the titles applied to the various positions in the commercial departments of central electric stations.

The Committee on March 5, 1915, without conference with other members of central stations, published the following report, suggesting certain titles for adoption by the management of central stations:

"The Committee herewith suggests the following titles that may appropriately be applied to persons connected with the Sales Departments of Central Stations.

The term "manager" is suggested for the head of the department, and the term "agent" for the heads of the sub-departments or divisions usually found in a large sales organization.

Person in charge of Department	Sales Manager
Assistant to Department Manager,	Assistant to Sales Mgr.
Person in charge of Advertising,	Advertising Agent
Person in charge of Power Division,	Power Sales Agent
Power Salesmen,	Power Salesman
Power Engineers,	Power Engineer
Person in charge of several district representatives,	District Sales Agent
District Salesmen,	District Salesman
Person in charge of Customers' room or store,	Office Sales Agent
Clerks,	Clerk
Cashiers,	Cashier
Person in charge of Appliance Department,	Appliance Sales Agent
Appliance Salesmen and	Appliance Salesman
Appliance Saleswomen,	Appliance Saleswoman

The Committee has not asked for opinions from member companies, realizing that there would be almost as many different suggestion as there are companies: in fact, the Committee members were obliged to "give and take" on this matter themselves. We believe, however, that the terminology suggested is in logical sequence.

Respectfully submitted,

Mathias Turner, *Chairman,*
Joseph F Becker
John G Learned
Committee"

Following the publication of these suggested titles, the Committee sent the following letter to sixteen of the larger operating companies:

"*To Member Companies of The National Electric Light Association*—
ATTENTION OF MANAGER, SALES DEPARTMENT.

At the last Convention of the National Electric Light Association in Philadelphia, a motion to adopt the term "Salesman" in place of "Solicitor" in all proceedings before that body was referred to a committee with instructions to report on this and also to suggest titles to be applied to the personnel of the Sales Organization of Central Stations.

Enclosed you will find the terms suggested by the Committee:

(1) Would you be willing to adopt them all in your company

(2) To adopt them in part, and which ones

(3) What eliminations, additions or changes would you require before adopting them in your own organization?

The Commercial Section Executive Committee desires this information by March 15th. Will you, therefore, please reply at once?

JOHN G LEARNED
JOSEPH F BECKER
MATHIAS TURNER.

Out of the sixteen letters thus sent replies were received from eleven companies, two only of which were willing to adopt the titles in full as suggested by the Committee. The position taken by several of the companies was that the titles used in their organizations represented a local development which they were unwilling to change. Abstracting some of these replies, we read:

"We feel rather partial to our own designations for sales department positions, as they have been a matter of development and in some respects are particularly fitted to our somewhat special organization."

"Attached hereto is a schedule showing the titles now in use by this company, and advise that we would not consider making any change in these titles."

"Enclosed is list of titles in force in the sales department of this company and these cannot be changed without authority from the executive department."

"The suggestions made appear to be most desirable and if one were organizing a new sales department they would be most appropriate for use. We, however, do not feel that we could commit ourselves to adopt them."

"* * * Regarding the name of the head of the department * * * the word 'Manager' hardly covers its varied activities. The word general should be included in the title, such as General Sales Manager—General Commercial Manager—General Sales Agent or General Commercial Agent."

"Our people have objected seriously to the word 'Manager' used in connection with any department of this company."

While some of the companies reporting were unwilling to make any changes in their present titles, other companies indicated that they would be willing to follow the Committee's suggestions, but with certain reservations.

> "I see no objection to this classification and eventually it is possible that we may adopt the various titles suggested. We are already using a number of them."
>
> "The present head of our sales organization is known as Sales Manager. * * * We have given up the term Solicitor for Salesman. * * * The terms suggested by your Committee are very good and when the time comes I feel that we shall be able to adopt most of them."
>
> "Object to the word Manager, otherwise, see no objection to the Committee's classification and will attempt as time goes on to have the company adopt the terminology suggested."
>
> "The titles of positions in our sales department conform very closely to the list submitted and we are willing to make the slight changes necessary * * * with the one exception of our Appliance Department."

Several of the companies reporting furnished the Committee with their present classification and corresponding titles. In some instances, the classification was more limited and in other cases was more extensive than that of the Committee. The Committee has tabulated these classifications, but only to the extent of showing the titles used by the various companies for the particular positions selected by the Committee as being common to most sales organizations.

After studying the replies received to the circular letter and considering the various titles suggested by some, which were usually those employed by the companies making the suggestions, the Committee felt that the classification it had submitted would receive favorable consideration from more companies than any other classification presented up to this time.

Various names used by different central stations for the sales organization included "Sales Department," "Commercial Department," "New Business Department" and "Contract Department." The designation "Sales Department," however, seems to be the most proper, probably for the very natural reason that this term is the one most familiar to the public as representing that department with which it has to do business.

Finally, the Committee recommends that the Association adopt the term "Sales Department" for that department of the central station which deals with the company's customers, and further that the Association adopt as many of the various titles proposed by the Committee as a large majority of the membership shall elect, leaving any titles to which there may be strong objection for the consideration of a future committee.

Respectfully submitted,

MATHIAS TURNER, *Chairman*
JOSEPH F BECKER
JOHN G LEARNED

TABULATION SHOWING TITLES NOW IN USE BY SOME OF THE LARGER CENTRAL STATIONS

	Committee's Suggestions	1	2	3	4	5	6
Person in charge of Dept., Asst. to Dept. Mgr.	SALES MANAGER Asst. to Sales Mgr.	COMMERCIAL MANAGER (a) Asst. Mgr.	SUPT. SALES DEPT. Asst. Supt. Sales Dept.	SALES MGR.	CON'T. AGT.	GEN'L. CON'T. AGT. Asst. to Gen'l Contract Agt.	GENERAL SALES AGENT
Person in charge of Advertising	ADVERTISING AGT.	ADVERTISING SUPT. (c)	SUPT. ADVERTISING DEPT.		IN CHARGE OF ADVERTISING	GEN'L PUBLICITY AGENT	ADVERTISING MGR.
Person in charge of Pr. Division	POWER SALES AGT.	SUPT. INDUSTRIAL POWER AND FUEL (a)	COMMERCIAL ENGR.	SALES ENGR.	PR. SALESMAN	PR. ENGINEER	MGR. PR. BUREAU Asst. Pr. Engr.
Pr. Salesmen Pr. Engineers	Pr. Salesman Pr. Engineer	Pr. Salesman Pr. Engineer	Commercial Engr.	Sales Engineer	Pr. Salesman Pr. Engineer	Pr. Salesman Sales Engineer	
Person in charge of several dist. representatives	DISTRICT SALES AGENT	SUPT. DISTRICT SALESMEN (b)	DISTRICT AGT.	SALESMAN	DIST. CAPT.	HEAD LIGHTING AGENT	DIST. MANAGER
Dist. Salesmen	Dist. Salesman	Dist. Salesman	Dist. Salesman	Salesman	Dist. Salesman	Lighting Salesman	Salesman
Person in charge of customers' room or store	OFFICE SALES AGT.	SUPT. GEN'L SERVICE (c)	OFFICE SALES AGT.				
Clerks Cashiers	Clerk Cashier	Counter Clerks Tellers			Clerk Cashier	Clerk	Clerk
Person in charge of Appliance Dept.	APPLIANCE SALES AGT.	SUPT. NEW BUSINESS AND MERCHANDIZING (a)	SUPT. APPLIANCE DEPT.			HEAD LIGHTING AGENT	DIST. MANAGER
Appliance Salesmen and Saleswomen	Appliance Salesman and Saleswoman	Sales persons	Appliances Salesman and Saleswoman			Appliance Salesman	Demonstrator

(a) Reporting to Pres. and Vice-Pres.
(b) Reporting to Supt. N. B. and Mdsg.
(c) Reporting to Comml. Mgr.

CHAIRMAN BURNETT: This report is now open for discussion.

DISCUSSION

MR. KENNEDY: It seems to me that the suggestions made by the Committee are along the right lines. Notwithstanding anything we may have heard to the contrary there is a great deal in a name and in a title, if they correspond with the work which the occupant of the position is called upon to fill.

In the larger companies and especially in companies that are doing business in a number of towns and communities, if we were to consider the title of manager as applying to one in charge of the commercial department, we would have a great many managers representing the same company. The general public does not, however, appreciate the difference between a General Manager and a Sales Manager. For that reason I do not approve of the report of the Committee in that one particular. The public is not likely to connect the word "sales" with the title of manager, consequently, a sales manager might say on subjects not directly concerning his own department what would be misconstrued and put down as statements of the company through its manager. I think the titles suggested by the Committee for other positions than that of manager are excellent.

MR. GIBBS: I would like to ask Mr. Learned how the Committee arrived at the use of the word "agent." We have advertising agencies and so forth. Personally, I would object to being called an advertising agent. My title is superintendent of advertising, or advertising manager. It is all a suggestive matter.

The concluding paragraph of the report contains a recommendation that a majority of the membership shall select such titles as will fit in with their organizations.

CHAIRMAN BURNETT: As I understand it the proposition is that we should try to clear up some of the misunderstandings, and some of what might be called the "loose talk" in our discussions of these commercial matters, especially in regard to calling our salesmen solicitors. The Section members think that the central station business has passed beyond the point where our men are mere solicitors. They are representatives, our outside representatives, and are more properly called salesmen. The Committee has undertaken to see if standard terms cannot be adopted for convenience. It seems to me that the report does not require any further discussion. I will ask Mr. Learned to close the discussion.

MR. LEARNED: I have nothing further to add. I suggest that some action be taken on this report, as to whether or not it is to be spread upon the minutes.

CHAIRMAN BURNETT: A motion has been made to accept the report as printed in the transactions.

(Motion seconded and carried)

(Adjourned)

SECOND COMMERCIAL SESSION

WEDNESDAY MORNING, JUNE 9

PRESIDENT SCOTT: Will the meeting please come to order?

We have with us this morning a man who was elected unanimously by the citizens of this city to carry out the great work of the Exposition. He has devoted five years of his time without compensation to carrying out this work. He has built up a wonderful organization, and you have seen the Fair and know what a beautiful Exposition it is.

Mr. Moore is practically, you may say, one of us, because he is engaged in engineering work. He has taken a great interest in our coming, and he has provided many unusual things for us. It is a great pleasure to introduce President Moore of the International Panama-Pacific Exposition. (Applause)

ADDRESS OF C. C. MOORE, PRESIDENT OF THE PANAMA-PACIFIC EXPOSITION

Your Chairman is right in stating that it has been our desire to give you unusual things and the best things. Perhaps my humble coming here is not one of them. I will say, however, that it is a little unusual, for this is the first time since the opening of the Exposition that the President has been away from the Exposition for any official act at all, and I am only delighted to lend my services to do what honor I can in a small way to your splendid Association and meeting here.

So far as welcome is concerned, I am sure that has been freely expressed to you by my associate, Director Britton, a man who has done much for the Exposition; for, gentlemen, if you have been out to look the Exposition over, or if you go out later and in thinking mood, you will appreciate the fact that the Exposition means the devotion, the enthusiasm, the intelligence and the best that can be offered, not by a few men, but by thousands of men.

Many countries also have contributed and many States, and therefore, I want you to understand, since you might, some of you, get a wrong impression from the Chairman's laudatory statements, that it has simply fallen to my lot to lead some splendid men, some splendid interests; and it has been their great satisfaction to have something ready that many of you have been good enough to speak to me hearty words of endorsement, and I trust all of you will feel the same way.

Now, in addition to your Convention here we have many other prominent meetings. Those of you who have looked into it have found that we shall have eight hundred and fifty congresses and conventions at this Exposition—an unheard-of number. There are certain of these conventions upon which we lay special store, upon which we put a very high valuation; and I want you to understand me rightly when I say that your Association is one of those. We have looked forward to your meeting with great interest. The fact that Mr. Britton is one of you; the fact that I am related to you by marriage, has not, in effect, been the cause of our interest. We understand and know the vital force and the power of the interests represented in this Association. We know of the public spirit and the high purpose of the men who for thirty-eight years have gathered together in different parts of this country aiming to advance their profession, their line of activity, and to profit the country as a whole. And, therefore, I, as a great believer in the potency that results from active, strong men getting together on frequent occasions for discussion and advice, I want to give you a word of greeting this morning, and of good will and good wishes, and an expression of our delight that you have chosen San Francisco for your meeting place.

Now, I hardly know how to choose the words to express to this Association the Exposition's debt and obligation to the business interests that you represent. Why, they come here from near and far, and say, "This Exposition has excelled anything ever done." We hope they are right, Britton and I, and others; but if they are right the reason for it is the introduction of the novel, the advanced; and the one feature that to my mind towers above all others in connection with this work, that differentiates it from anything that is past, that, I believe will hold out to the future a great mark of encouragement—that one feature of the Exposition is the lighting. And you, good gentlemen, coming from different parts of the country will, I believe, thrill with pride and satisfaction that your line of business has contributed so much to the Exposition's greatness.

We have as a physical exhibit a remarkable showing of hydro-electric power. Some of the insurance people having selected San Francisco say they were justified in so doing because San Francisco is the greatest insurance exhibit in the world. By the same token I think it can be fairly said that the Exposition, both by the nature and origin of its current, and in its method of distribution and handling, is perhaps the greatest electrical exhibit that has been shown to date; and in connection with acknowledgments to you of the craft of the great service rendered us by the Pacific Gas & Electric Company and its splendid officers, acknowledgment also should be made to the man the results of whose genius you will see to-night. Mr. Ryan, of the General Electric Company, has been a most important factor for us. He has brought to our work genius, enthusiasm, controlled by a judgment that has been admirable; and I cannot imagine that any Crusader swayed by ever so strong emotion, could have entered on his quest with greater purpose and earnestness than did Mr. Ryan. Our engineers have, so far as they could, assisted him. We do good team-work in the Exposition. (Applause) We have endeavored to aid and co-operate with him in every way we could; and so far as the result is shown, you have heard of it, I know; no man in the lighting business has failed, I am sure, to hear of the triumph of lighting at the Exposition. We hope that you will like what you see, and will feel a personal satisfaction and interest in the accomplishment.

So far as the Exposition, itself, is concerned, gentlemen, there is not much to say to you. You are here and can see for yourselves. It might be of interest for you, however, to know that never before—I can fairly state that—never before in the history of the world have so many nations been brought together as are represented here at San Francisco. Certainly, never in the history of this Nation has there been any such gathering of Nations and States. We exceed Chicago and St. Louis in point of the numbers of countries and States of our own Union that are taking part here; and, in fact, some of our States are greater, as we all know and are proud of, than many foreign countries, anyway. Now this Exposition is smaller than that of St. Louis in ground area; a trifle larger than Chicago in ground area; a trifle smaller than either of them in acreage of buildings; but, so far as the ground area is concerned, we stand second in the world's history, next to St. Louis; in point of acreage of buildings we stand third. Nothing has ever been attempted in Europe on a scale approaching the Exposition here.

Now, of course, the war was to us a serious matter. You good Americans have a right to know that. There were days that we did not know whether we could capitalize our determination to go ahead. The exhibitors of the Nation seemed to accept with unanimity the idea that they could not go on. They thought we must stop, and therefore the exhibitors would stop, and, naturally, we would be vitally hurt. But, fortunately, we were able to get into their minds the fact that we would not stop; we were going ahead; and when that consciousness was thoroughly aroused, then splendidly did the exhibitors respond, and we were able to produce what is here to-day—an Exposition in full bloom in a condition of the world's history, friends, such that perhaps, anybody here would understand and would have justified us had we not gone ahead at all. But we felt that we were celebrating a national achievement, and in spite of the lamentable situation in Europe, the obligation was on us to continue, and continue we did with misgiving often, discouragements and obstacles a-plenty, but we determined it must go on. Americans and world-citizens have commended us, and said we did well. Had we stopped through pressure of the war, we would at least have contributed to a condition in this country that all of us should have desired to avoid.

Therefore, good friends, if what we have done meets with your approval, we are immensely gratified; if it stirs your pulse a little, those things in your line and others, we are still more gratified. We hope that there are lessons for you in what we have tried to put forward here in architecture, in color, in landscape, in lighting and the associated sciences; we hope that there is culture to be gathered from the exhibits from abroad, from all over the world—because, gentlemen, parenthetically, the United States Government sent the "Jason" to Europe and brought back exhibits from the belligerent countries that we were unable to obtain in any other way—since comparatively few nations of the world but are represented in some form in exhibits at the Exposition. Now, we have done our level best. We have gone at it in the spirit of patriotism, of earnestness, of an honest desire to confer benefits, directly and indirectly, on all who come to our gates; and the board of directors, of which Mr. Britton and I are members, has always striven to create in this work a substantial substance, if you will. We wanted with that substance a form, beautiful, attractive, effective, but the form to be only the exterior dress. If within that dress there is not intelligence, mind and soul, then the woman is a base thing, and so is the Exposition. And earnestly have we endeavored to have the effect of what has been gathered here far-reaching,. so that in the years to come, when the question of the Panama-Pacific Exposition comes up, those that have been here will feel satisfaction, pride, and personal profit; and those who were unable to come will say that the men who completed the task, with the spendid aid given to them by the Californians, by the States of the Union, by the countries of the world, did present something unusual and advanced; something that will last in memory and last in history, that will have the charm and solid benefit, from which can grow the tree of knowledge and benefit for all time. Now, if that has been our purpose, I assure you that we have had much to oppose us, much to discourage. But if you say we have done well, it will be one of the compensations to us for having given what we have to this work.

Now, in your deliberations, good friends, you have our best wishes; you have our hopes that the fullest benefit will come to you all. I look forward to this evening when you will see the Exposition under conditions especially prepared for you. We cannot always do the things we intend doing for you tonight, not but that we would like to, but conditions make that impossible. However, I am going to try to be there to-night to meet as many of you as I can. Now, your deliberations will soon be over, and I hope most earnestly that what you have gained here, the advice, the assistance, the mutual confidence and co-operation, the making of new friendships and renewing of old ones—will be beneficial, and I know it will be pleasant to you. I hope, too, that your deliberations and conclusions will be of the greatest value to yourselves and to your business, as I know they will be of benefit to the interest, to the business, to the science of lighting. And please remember when you leave here that we have put the highest value on your coming; and if we have left anything undone that any of you think should have been done, please accept the assurance from me that it was not our intention, for the best that is here is none too good for you; and any omissions please charge to the head and not to the heart. I thank you. (Applause)

President Scott: I think, President Moore, that you will find the men in this room do appreciate your Exposition, and will all be very glad to tell their friends about it. Thank you very much for delivering your address.

Chairman Burnett: Your Power Sales Bureau Committee, has had prepared a most interesting report for the Power Session of the Commercial Section. It was felt that there would be so much general interest in this report, and that so many people besides those connected with power sales would be interested in it that it has been placed on this part of the program, to immediately follow President Moore's address. Mr. J. M. McDougal of the Pacific Gas & Electric Company, San Francisco, will now present his report.

REPORT OF COMMITTEE ON TYPICAL POWER SALES DEVELOPMENT IN THE WEST

The Committee on Typical Power Sales Development in the West did not feel that there were many, if indeed any, installations that were peculiar to the West alone. Many of the installations treated of in the following pages are probably more highly developed elsewhere than in California, but being somewhat selfish, we felt that the discussion would bring out points that would show us how to bring these installations to a higher efficiency. We trust that there will also be found in the case of installations more particularly Western some things of value.

It was the purpose of the Committee in this report to make it of value to the man going after new business from either new or present customers. In doing this, data as complete as possible on similar installations are of tremendous value.

We have been considerably handicapped in the preparation of this report on account of the great distance geographically between the different members of the Committee, the distance by rail between the most distant members being 2141 miles. This delayed the start of the work until there remained only about three weeks in which to do the actual work. As a result, the reports are not as complete or of as great variety as we had hoped for. We have tried, however, to bring out the points of interest in each installation and have given as many other data as the short time permitted.

Respectfully submitted,
J H McDougal, *Chairman*

W L Boxall
C H Brewer
E L Chandler
R E Frickey
H J Gille
E B Griddle
L M Hardie
G E Hardy
E G Hoy
W H Lewis
B W Mendenhall
M C Osborne
H P Pitts
W W Shepard
H S Wells
E A Wishon

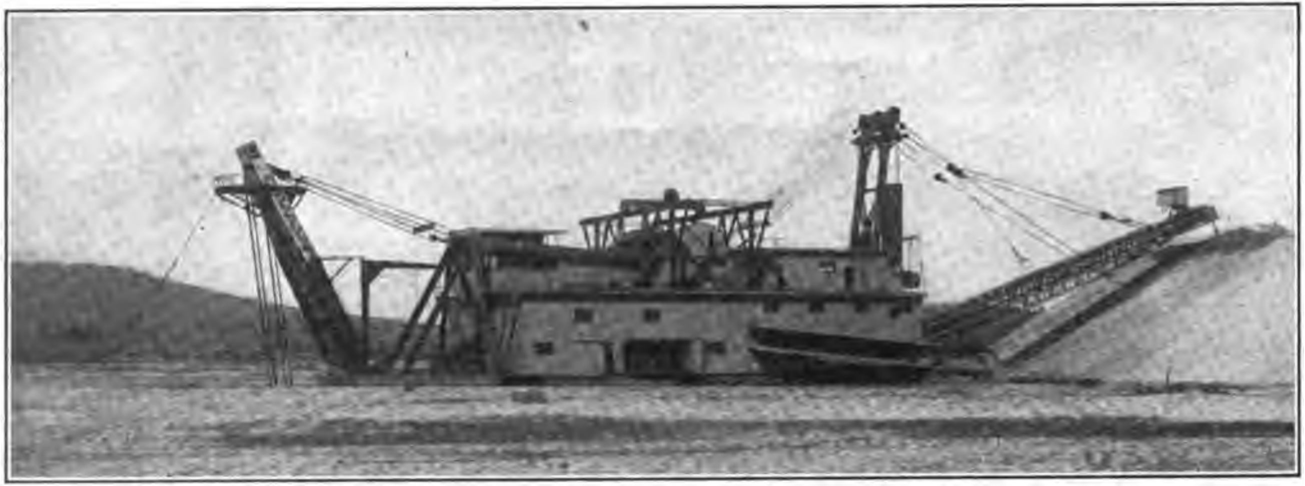

Fig 1—Gold Dredge Showing Rock Pile

GOLD DREDGING

The gold dredge is an elevator type of dredge digging by means of an endless chain of buckets, operating over two tumblers at the extremities of a long ladder, the upper tumbler acting as a driving sprocket. The free end of the ladder is suspended from the bow gantry and is raised or lowered for different depths of digging. The dredge is ordinarily pivoted on a "spud" at the stern and the bow is swung first one way and then the other by means of side lines operated by the swing winch. This motion carries the ladder with its endless chain of buckets to and fro, across the face of the cut.

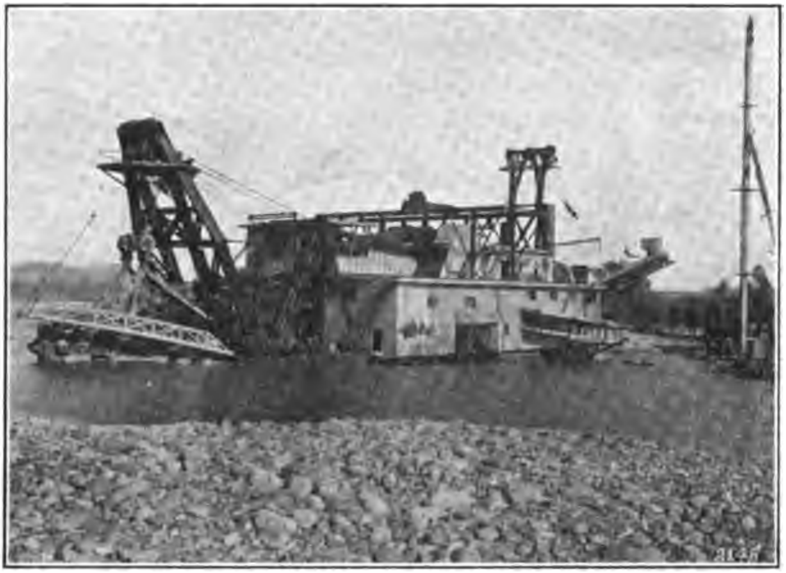

FIG 2—GOLD DREDGE SHOWING POND

As the buckets pass over the upper tumbler, they dump into a hopper where the material is broken up by means of high pressure water jets and then passes into the screen, usually of the revolving type. While in the screen, the material is played upon by high pressure water jets and thoroughly washed so that everything except the boulders and heavy gravel passes through the perforations on to the distributer and thence to the gold saving tables.

The boulders and heavy gravel are delivered from the end of the screen to an endless belt conveyor or stacker, which dumps this material a sufficient distance astern, so as not to interfere with the operation of the dredge.

The gold bearing material which passes through the perforations of the screen and so on to the gold saving tables, is there met with additional water from the low pressure pump and the whole passes over the tables where the gold is amalgamated with the mercury contained between the riffles. The waste passes out at the stern of the dredge into the pond. As the dredge moves forward, it carries its pond with it and sufficient make up water has to be supplied to compensate for seepage and evaporation.

In electrically operated gold dredges, the current is delivered aboard the dredge by means of an armored shore cable. This cable comes aboard near the stern and goes to the incoming line switch, from which the current is supplied to the transformers, if these are used; or, if the motors are wound for the supply voltage, the current is carried direct to the distributing board from which the individual motor circuits are controlled.

The various motor drives are as follows:

Digging Motor

This is a variable speed motor with reversible control for continuous operation at reduced speeds. It drives the endless chain of digging buckets and, usually, also operates the ladder hoist-winch, although this is sometimes taken care of by a separate motor.

Swing Winch

This is a variable speed reversible motor for continuous operation at reduced speeds. It operates the side lines which swing the boat to and fro while digging, raises the spuds, etc.

Screen Motor

This is sometimes a constant speed and sometimes a variable speed motor. The variable speed feature is useful on clean up days and in making repairs. The motor drives the screen.

Stacker Motor

This is also sometimes a constant speed and sometimes a variable speed motor. It operates the stacker which disposes of the tailings from the screen.

Pumps

There are usually high pressure, low pressure and auxiliary pumps, and sometimes in addition to these, there are hopper and monitor pumps.

The monitor pump supplies water to the monitors, which are mounted at the bow of the dredge and throw high pressure water jets against the bank, thus breaking up the material so that it can be better handled by the dredge.

GOLD MINING AND MILLING

Electricity is used very extensively in gold mining and milling. In the mine it is used to operate the compressors for furnishing air to the drills, for operating electric locomotives, hoists, etc, and for running pumps. It is used throughout the mill for all operations requiring power.

Probably the simplest form of mill for the extraction of gold is the mill used in conjunction with a gravel mine where no crushing is done. The ore is taken from the bins put through a washer and thence over amalgam plates where the mineral is collected. A further recovery is made by concentration.

With a crushing plant the ore from the bins is put through a rock crusher which grinds to a certain size, thence through the stamp which grinds finer. The fineness of grinding necessary to free the mineral content of the ore for treatment varies considerably in different mills. From the stamp the ore passes over amalgam plates where a percentage of the mineral is collected and thence to the concentrating tables. The concentrates are then smelted into bullion.

The treatment of ores varies in different mills as well as different localities depending upon the character and hardness of the ore, which determines the treatment and the size of plant necessary for a given daily tonnage. Many extensions and improvements are made on the simple crushing and concentrating plant by the addition of tube mills, cyanide plant classifiers, agitators, filters, precipitating and refining plants and sampling and assaying plants.

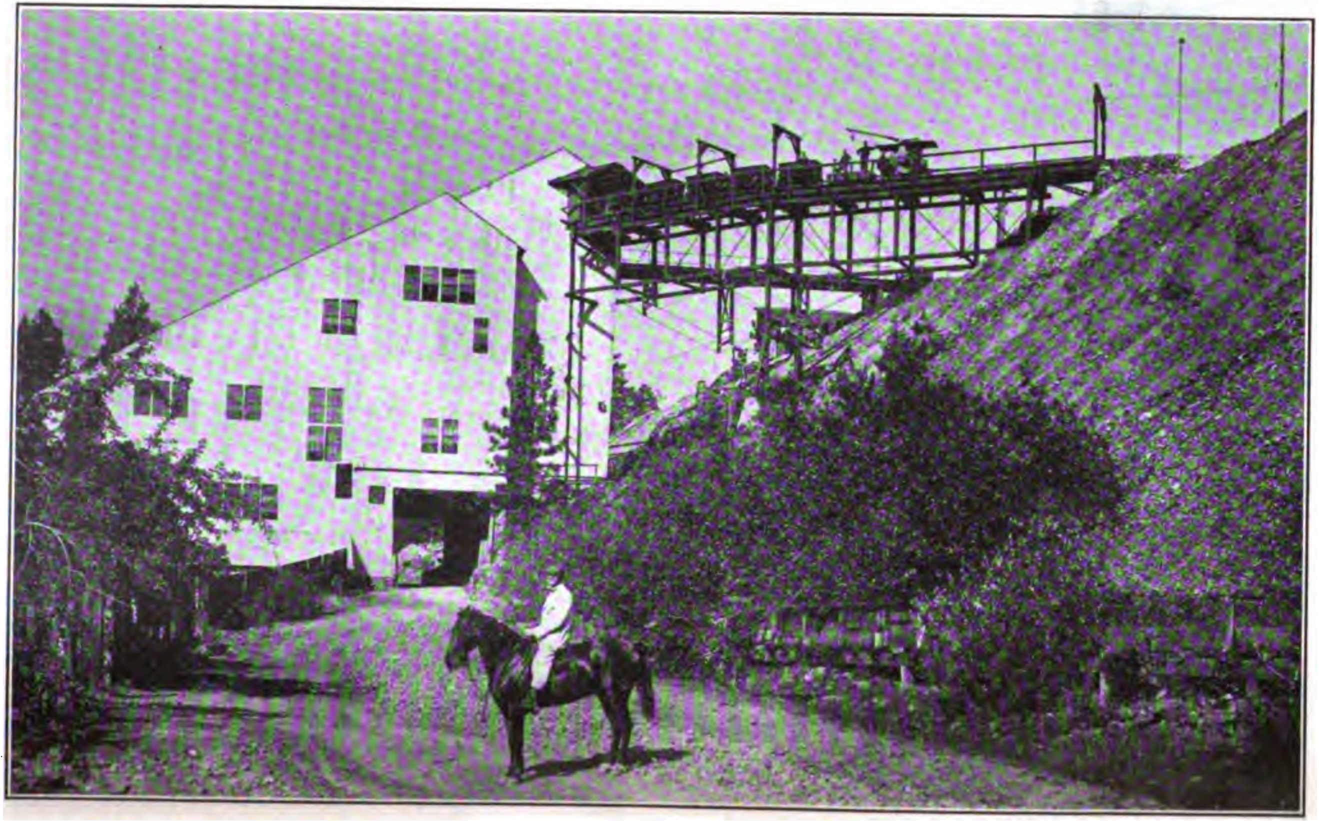

FIG 3—GOLD MINING STAMP MILL

INSTALLATION

We give below a typical equipment of a gold mining and milling establishment in Nevada, using 2000 hp of motors and 610 000 kw-hr per month.

Haulage—
2—Electric locomotives, 4 ton each, 250 volts, 5.6 miles per hour, 2000 lb dbp

Machine Shop—
1—20 hp, 900 rpm, squirrel cage induction motor

Carpenter Shop—
1—15 hp, 900 rpm, squirrel cage induction motor

Crushing Plant—
1—150 hp, 600 rpm, squirrel cage induction motor

Mine Water Pump—
1—5 hp, 1200 rpm, squirrel cage induction motor

Continuous Current Generator—
1—50 kw, 1200 rpm, 250 volt generator
1—Induction motor for driving c-c generator, 75 hp, 1200 rpm, squirrel cage type
1—Exciter for motor-generator set, 14 kw, 1800 rpm, 125 volt
1—Induction motor to run above exciter, 20 hp, 1800 rpm, squirrel cage type

Compressor (mine)—
1—450 hp, 150 rpm, synchronous motor

Compressor (mill)—
1—35 hp, 000 rpm, squirrel cage induction motor

Pump motor No. 1—
1—25 hp, 1200 rpm, squirrel cage induction motor

Pump motor No. 2—
1—75 hp, 900 rpm " " " "

Pump motor No. 3—
1—10 hp, 1200 rpm " " " "

Pump motor No. 4—
1—10 hp, 1200 rpm " " " "

Pump motor No. 5—
1—7½ hp, 1200 rpm " " " "

Compressor floor sump—
1—5 hp, 1200 rpm " " " "

Vacuum pump—
1—35 hp, 900 rpm " " " "

Replacers—
1—15 hp, 900 rpm " " " "

Tube mills 1 and 2—
1—150 hp, 600 rpm " " " "

Tube mills 3 and 4—

1—150 hp, 600 rpm, squirrel cage induction motor

Tube mills 5 and 6—

1—150 hp, 600 rpm, squirrel cage induction motor

Rotary Pump—

1—20 hp, 900 rpm, back geared squirrel cage induction motor

Battery motors—

9—20 hp, 900 rpm, back geared squirrel cage induction motors

Conveyor No. 1—

1—35 hp, 900 rpm, squirrel cage induction motor

Conveyor No. 2—

1—35 hp, 900 rpm " " " "

Agitators—

5— 3 hp, 600 rpm " " " "

Classifiers—

1— 5 hp, 900 rpm " " " "

Thickeners—

3— 2 hp, 600 rpm " " " "

Tramway—

1—11 hp, 900 rpm, slip ring type induction motor

Small mill compressor—

1—75 hp, 720 rpm, internal resistance induction motor

Assay office—

1—5 hp, 900 rpm, squirrel cage induction motor

Fan—

1—¾ hp, 3600 rpm " " " "

Stamps weigh 1660 pounds each and are among the heaviest in the United States today. Stamps are in batteries of five, each battery being driven by an individual back-geared motor of sufficient power to lift the stamps from rest and start them going without the necessity of hanging them up.

Six-tube mills are 6 by 16 feet, being larger in diameter and shorter in length than mills heretofore used in this work. They are arranged in groups of two, each group driven by a 150-hp motor with outboard bearing and Morse silent chain-drive.

Six Dorr classifiers, the largest constructed when the plant was installed, are driven by a 5-hp motor driving a line shaft which is the only one in the mill.

On the opposite side of the mill from the conveyor is the automatic incline electric elevator, which runs up and down from top to bottom of the mill to facilitate the travel of the men from one end of mill to the other and also to deliver supplies to different floors.

Power, delivered at 60 000 volts and transformed to 440, is connected to the subsidiary line and also to the main line of the Power Company to insure continuous service.

This property is the best equipped in the country, with machine shop, blacksmith shop, carpenter shop, assay office, warehouse, club house, main office, boarding houses and bunk houses, superintendent's residence and cottages. The machine shop has a 20-ft lathe, planers, an oxyacetylene welding outfit and all kinds and grades of tools, with a carpenter shop as fully equipped.

ELECTRICITY IN COPPER MINING AND SMELTING

Electricity is used at the mine for operating compressors which supply air for the drills, in operating mining locomotives and hoists and in operating the crushers. The crushed ore is transported to the smelter by electric and steam locomotives, where it is charged together with suitable fluxes, consisting of limestone and silicious ores, into the blast furnaces which are supplied with air from electrically-driven blowers.

The product of the blast furnaces is slag and copper matte, The slag is drawn off into cars pulled by electric locomotives and is carried off to the dump. The matte is conveyed in ladles by electric cranes to converters which are very similar in principle to the Bessemer converter used in steel production. They are supplied with air from electrically-driven blowers. The product of the converters is blister copper. This is poured into ladles handled by electric cranes and cast into pigs. Blister copper is the finished product and contains about 2 per cent of impurities.

In this plant the gases from the blast furnaces have to be treated to render them harmless to vegetation. This is done by cooling and diluting the gases with large amounts of fresh air supplied by electrically-driven blowers, and filtering the gases by passing them through woolen bags in a bag house. As this means increased resistance to the flow of gases from the furnaces, it results in the use of a good deal more electric power for operating the blowers than is required where this treatment is unnecessary.

In a smelter installation of this plant located in Shasta County, Cal, there are 45 motors installed, with a total connected horse-power of 4310, the motors ranging from 5 to 750 horsepower in size, the average kilowatt-hours per month being 1 071 700. The rated yearly capacity of the plant in manufactured output—blister copper—is 10 000 tons. In a mine installation there are 15 motors with a total connected horse-power of 1366, in sizes varying from ½ to 300 horse-power, and the average kilowatt-hours per month is 244 100, the output of the mine being 1275 tons of ore per 24 hours.

STONE QUARRIES

Crushed stone and rock are obtained from two sources, from the beds of streams and from volcanic deposits. In the latter the rock is blasted out of the deposit, compressed air being commonly used to drill the holes, and loaded on a car by means of a steam shovel.

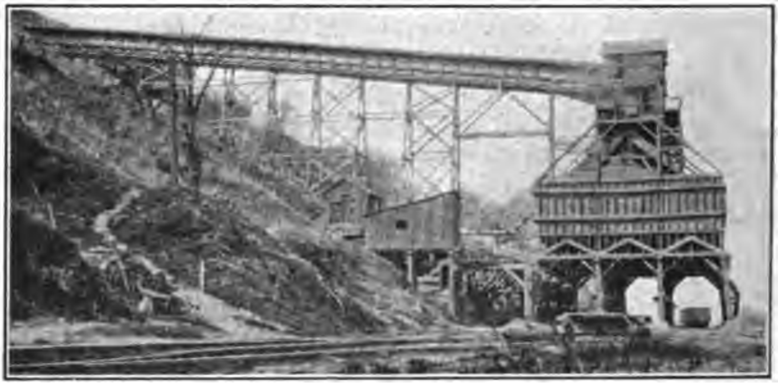

FIG 4—GENERAL VIEW OF STONE QUARRY

The rated capacity of one plant is 300 000 tons per year of crushed rock and 100 000 tons of washed gravel. The working hours per month are 260, the total motor capacity is 1728 horse-power, all motors being 2200-volt 3-phase, 60-cycle, mostly belt drive. The monthly consumption varies from 38 800 kilowatt-hours in February to 133 600 kilowatt-hours in July.

GRANITE QUARRIES

In many parts of the West a considerable quantity of granite is quarried. In the smaller quarries, curbing is the principal product, but in the larger ones building stone, including cornices and pillars is produced, and the scrap is used for curbing or sold to the railroads for ballast. Nearly all the quarries are now using central station power.

The most common use of power is for compressing air, the compressor motors ranging in size from 15 or 20 to about 100 horse-power. As the demand for granite fluctuates greatly, it is not deemed advisable to install large compressors, but rather a number of small units, so that when the quarry is working light it will not be necessary to operate a large compressor partly loaded. The air is used for drills and chippers which require from 10 to 100 cu-ft of air per minute, depending on the size.

In one of the larger quarries a saw has been installed which will be of especial interest, as it is the only one of its kind, and will do work that can be done in no other way. By the use of the saw slabs ⅝-inch thick can be turned out. The saw consists of channel irons to which are bolted sheets of steel 7/16 in by 12 in by 7 feet long. These form the teeth of the saw of which there are normally seven spaced about 8 inches apart. Ordinarily four of these saw-blades are used at one time, making four cuts. The saws rest on guides which are lowered as the cut deepens. This lowering is done automatically, the rate of lowering being under the control of the operator. After the cut is well started, the feed is twelve inches per hour. The reciprocating motion is imparted to the saw by a connecting rod from a crank disc which is belted to a line shaft. The real cutting medium is No. 2½ chilled-steel shot fed into the cut with water. About 75 pounds of shot are used up per hour. An average day's run consists of about 125 square feet of cut. About 1/16 inch of tooth is worn off per inch of cut. The travel of the saw is 350 feet per minute.

The saw is driven through a jack shaft by a 60 hp 720 r p m motor which also drives a 10 by 10 Burry compressor at 150 r p m. A number of tests were made from which it was found that about one square foot of cut could be made per kilowatt-hour. The maximum kilowatt input was thirty-four. The slabs sawed are from ten to twelve feet long. The shot after being fed through the saw are caught in a trough containing a screw conveyor which carries them to a bucket elevator which elevates them to a distributor.

After sawing, the stone is finished by polishing machines operated by 5-hp motors. In the first step of the process, a revolving scroll is used, into which are fed chilled shot. After the roughness is worn off, carborundum is substituted for the shot.

The final polishing is done by flour putty on a felt or rope wheel.

The stone is handled in the sheds by a 20-ton Lane Brothers' crane, operated by an endless rope driven from the main line shaft.

Hoisting from the quarry is still done by steam as is the draining of the quarry. Their total fuel bill is about $20 per month. A change to electricity would cost about $1,500, so that as long as their present machinery lasts, it would not pay them to change.

There are four motors aggregating 200 horse-power, using from 13 000 to 24 000 kilowatt-hours per month.

MANUFACTURING GIANT POWDER

California has one of the oldest and also largest of giant powder companies, located on San Pablo Bay, on 1200 acres of ground occupying nearly 75 distinct buildings. Central station service is supplied at 2000 volts and distributed at this voltage to the various plants where it is stepped down to 220-440 volts. The 37 motors aggregate 736 horse-power, the average kilowatt-hour consumption per month being 63 400 and 1/10 kilowatt-hour is consumed per pound of powder manufactured. The actual output of powder for the year was 7 000 000 pounds.

RECLAMATION

About 1 725 000 acres bordering on the Sacramento and San Joaquin Rivers and their tributaries are subject to overflow during the winter. As this land is the richest in the State, an immense amount of money has been expended to keep the water out. Hundreds of miles of high levees have been constructed to keep the rivers from overflowing but, as there is considerable seepage through these and rain water must be run off the land, it is necessary to have pumps to throw this back into the rivers.

The first district to start reclamation was what is known as the Delta at the junction of the Sacramento and San Joaquin Rivers. This land was originally swamp and has been built up by decaying vegetables and silt from the rivers. This made a soil so productive that in the earlier days when the land was flooded at every period of unusual high water, it was made to pay well if one out of three crops could be harvested, in spite of the heavy charges for levee work, etc. At first "wheel barrow levees" two or three feet high were sufficient, but as more country was reclaimed and available space for the flood

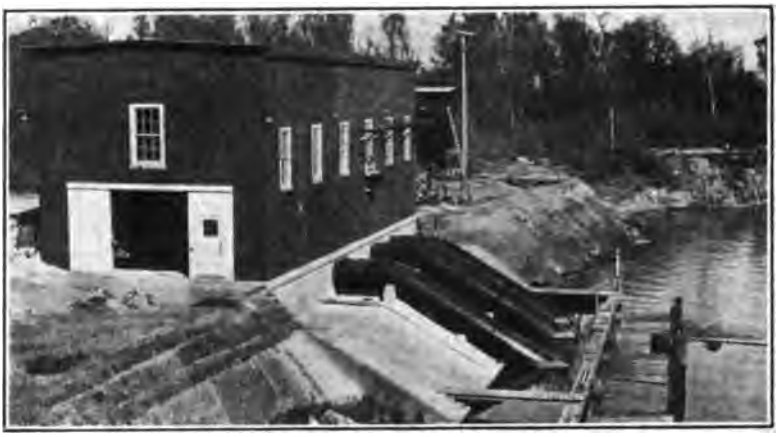

FIG 5—EXTERIOR OF RECLAMATION PLANT

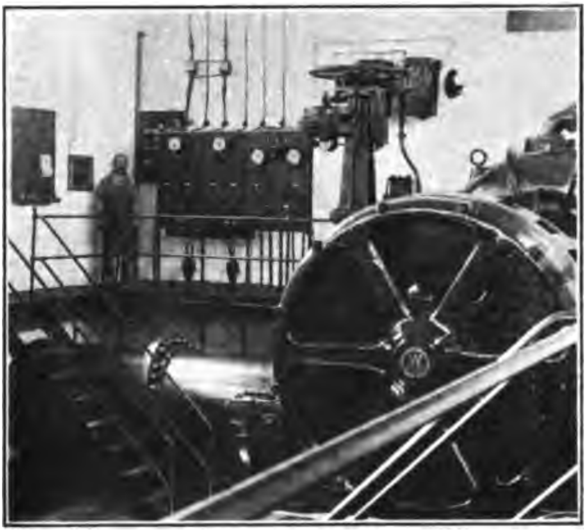

FIG 6—INTERIOR OF RECLAMATION PLANT

waters thus became restricted, it was necessary to increase their size. Some of the levees are now 25 feet high and 40 and 50 feet wide at the base. These are now built by large clam-shell dredgers.

In the better farmed districts irrigation is practiced, but as the level of the land is generally lower than the water outside, siphons or flood gates are used. If the water is allowed to remain on the land for too long a time, however, it has a tendency to sour it. It is necessary, therefore, to pump this off, which gives a certain amount of pumping throughout the year.

The kilowatt-hour consumption per month for a typical 150-hp plant in this district varies from 10 560 in November to 101 440 in January.

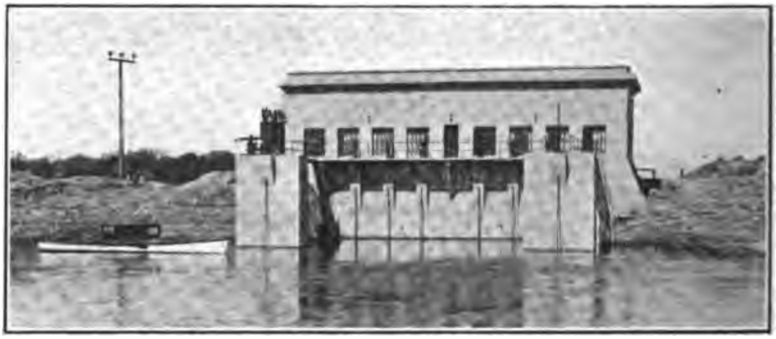

FIG 7—EXTERIOR OF RECLAMATION PLANT

In the northern part of the Sacramento Valley, a number of large districts have recently been formed. These have not yet been running sufficiently long to give much idea of the revenue derived, but a short description of a few of them may be of interest.

Plant A contains three 650 hp 2200 volt 250 rpm 3-phase motors, 2 being Westinghouse and 1 General Electric, direct-connected to three 50-in pumps nominally rated at 200 second feet. The plant drains 40 000 acres.

Plant B contains two 650 hp Westinghouse motors direct-connected 50-in pumps nominally rated at 200 second feet. The plant drains 40 000 which the pump is to operate will vary from 10 to 28 feet.

Plant C contains six 800 hp General Electric motors each direct-connected to a 50-in pump. The maximum head against which the pumps are to operate is 29 feet. This plant drains the largest district in California comprising 66 000 acres.

Plant D contains five 50-in pumps each direct-connected to five 600 hp General Electric motors. The maximum head against which the pump is to operate is 24 feet. The area drained is 53 250 acres.

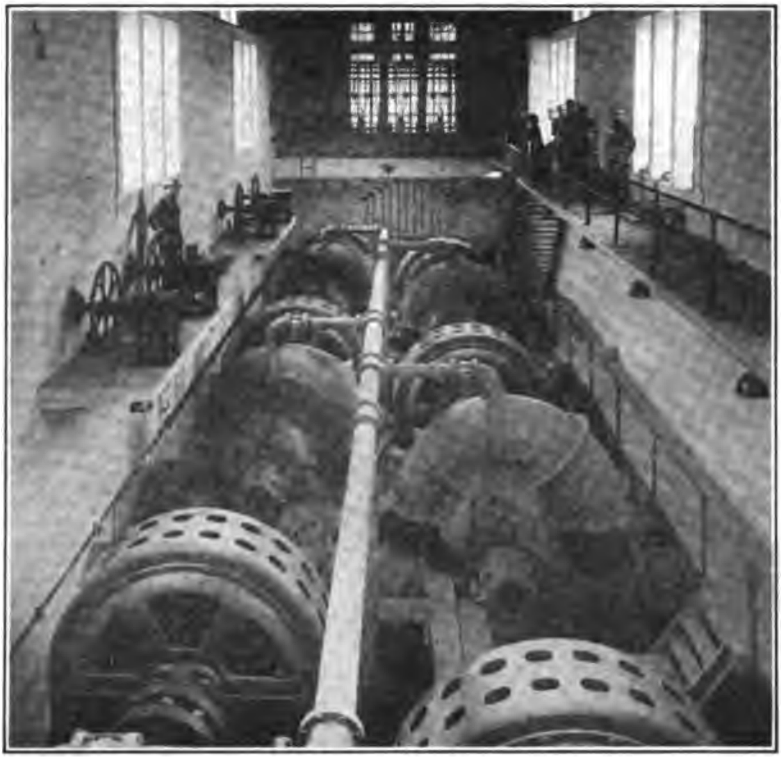

FIG 8—INTERIOR OF RECLAMATION PLANT

Some idea of the amount of water handled by these plants may be formed when it is considered that these four plants operating less than half an hour per day could supply San Francisco with all its water. There are now installed about 24 000-hp in motors driving reclamation plants in the State.

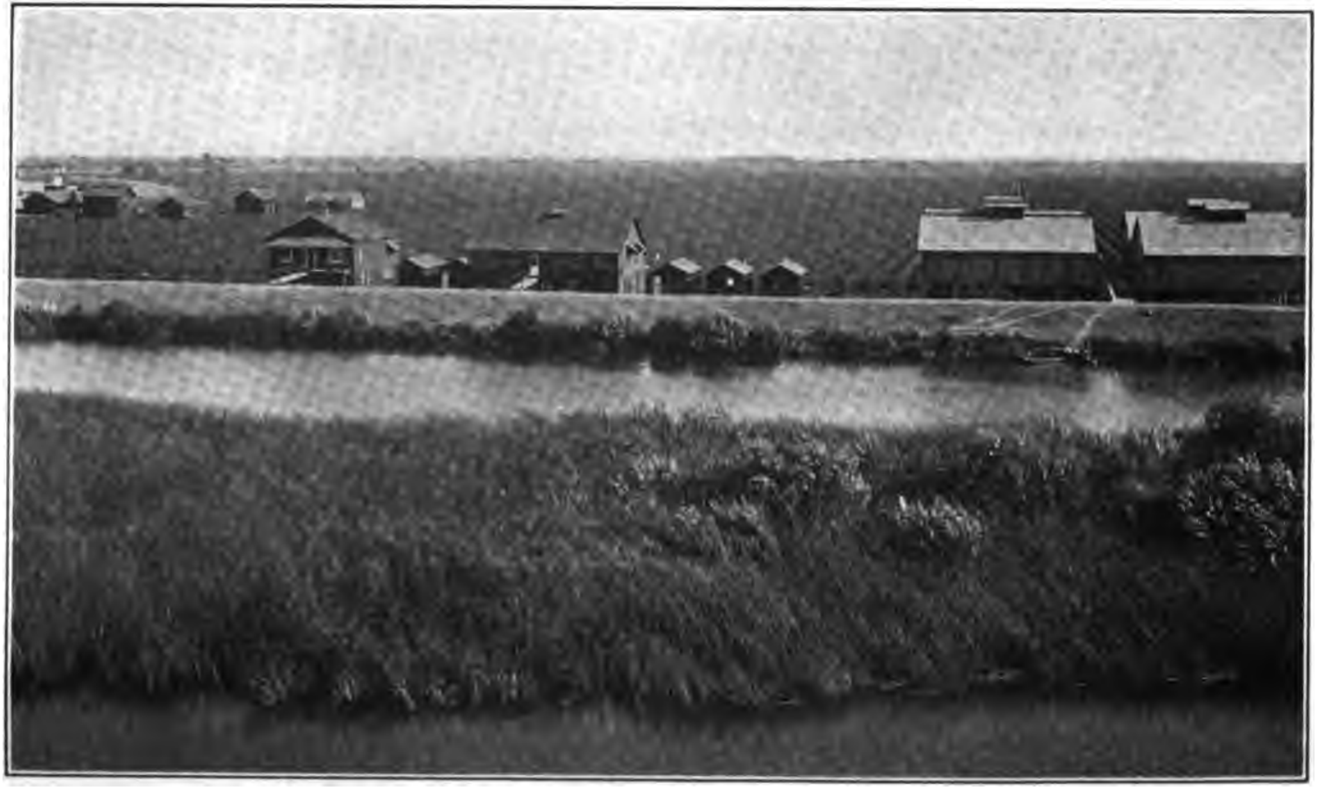

FIG 9—SCENE IN DELTA REGIONS

IRRIGATION

In the State of California there are about 20 000 000 acres of arable land, the greater part of which it is possible to irrigate. In the early days practically all the irrigation was done by the diversion of water into canals. Later, however, with the advent of successful types of motive power in small units, use was made of the underground waters that are found underlying nearly all the valleys of the State. It was found that the ability to get water on the land when needed instead of awaiting the pleasure of the ditch company, and to avoid having the seeds of weeds from land above put on the land with the water, made an individual pumping plant very desirable. There is some land, however, which requires a system combining the two methods, since its elevation above the adjacent stream would require a canal of prohibitive length, or the great depth of the water plane, where water can be found at all in sufficient quantities, would make pumping from wells very costly.

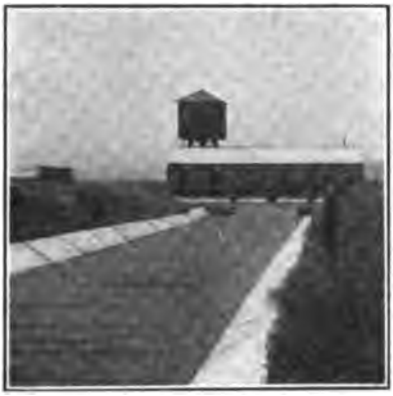

FIG 10—WATER FLOWING INTO THE SUMP OF ONE OF THE PLANTS WHERE SEVERAL LIFTS ARE USED

In some parts of the State a small reservoir is used into which a pump discharges during twenty-four hours daily of the irrigating period, while the irrigating is done a part of the time only, thus giving a much larger head of water. This means a long-hour load for the Power Company, which is especially attractive in many places, due to the fact that owing to the light rainfall it is necessary to irrigate every month in the year. The load curve given for eleven plants shows a yearly load-factor of 61.1 per cent.

The following data are taken from a portion of the State where very good flowing wells are found and where the rainfall is sufficient so that it is necessary to irrigate a few times in the year only.

Plant A consists of a 6-in Krogh pump discharging 797 gal per min, direct-connected to a 15 hp 1200 rpm General Electric motor. This supplies water for 37 acres of alfalfa, from which 280 tons were harvested. The total head is 34.3 feet, of which 25.1 feet were suction. The maximum demand at the time of test was 9.7 kilowatts giving a load-factor of 12½ per cent. The efficiency of the plant was 52.8 per cent.

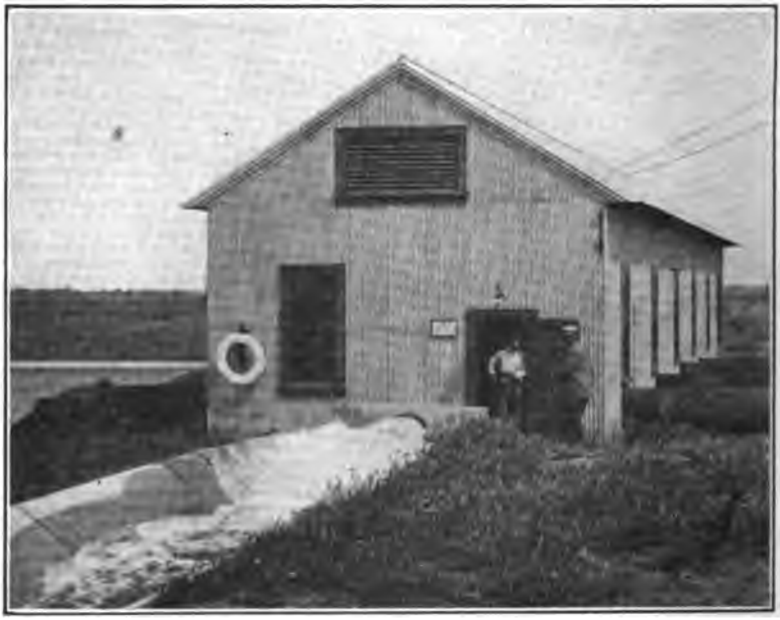

FIG 11—DISCHARGE FROM ONE OF THE PLANTS WHERE SEVERAL LIFTS ARE USED

Following are the kilowatt-hours by months:

Jan	0	April	400	July	1940	Oct	0
Feb	0	May	2470	Aug	1830	Nov	0
Mar	440	June	1200	Sep	2290	Dec	0

Plant B consists of an 8-in Byron-Jackson pump, direct-connected to a 20 hp 900 rpm Fairbanks-Morse motor, throwing 930 gal per min. This supplies water for 140 acres of alfalfa from which 1000 tons were harvested. The total head is 33.6, of which 21.1 feet were suction. The maximum demand at the time of test was 13.7 kilowatts, giving a yearly load-factor of 25 per cent. The plant efficiency was 43 per cent. Following are the kilowatt-hours by months:

Jan	0	Apr	2240	July	5490	Oct	3240
Feb	0	May	3310	Aug	6830	Nov	0
Mar	0	June	4060	Sep	5960	Dec	0

An irrigating system of the type already mentioned as a combination of ditch and individual pumping plant, will now be considered.

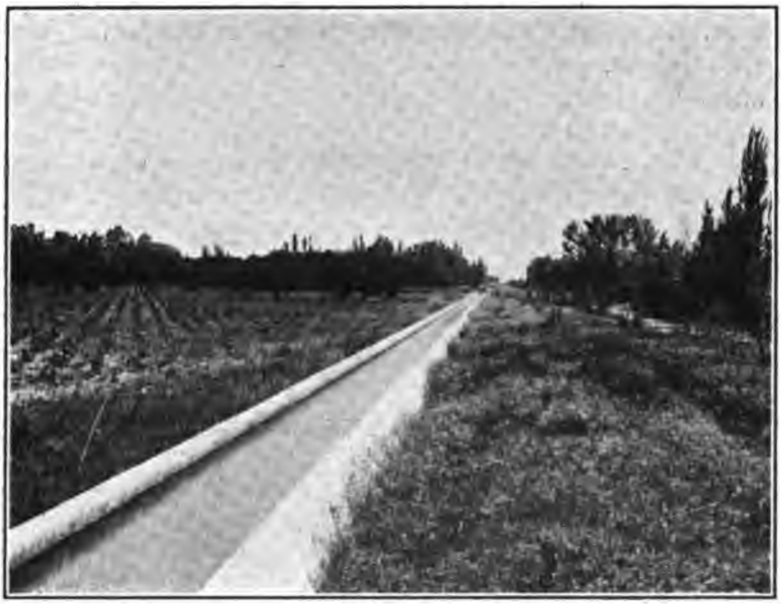

FIG 12—CONCRETE LINED IRRIGATION DITCH

A ranch of 18 500 acres sloped from a river back into the foothills. As there was but little fall to the river, it would have been necessary in order to irrigate the higher portions of this ranch to build a gravity canal for such a distance as to make the cost prohibitive. The system employed was to lift the water from the river into concrete lined canals elevated above the surrounding land. The water then flowed by gravity through the canal to the next pumping plant where it was again lifted and so on until it reached the higher contours. The height of each lift was dependent upon the relative costs of a pumping plant and higher embankments for the ditches. On some of the higher lifts it was found to be more economical to use piping.

The eight plants use 20 pumps with an aggregate capacity of 910 hp, the heads being 12 to 40 feet. All pumps are driven through a chain by a separate motor. In plant No. 6 arrangement has been made so that the pumps can be connected in series to lift 57 feet.

The total number of acres under irrigation during the past season was 12 500. Next season it is expected that 14 000 acres will be watered. The kilowatt-hours used for the past year by months were as follows:

Jan	0	Apr	32 000	July	811 200	Oct	182 400
Feb	1 600	May	587 600	Aug	734 400	Nov	0
Mar	12 800	June	764 800	Sept	555 200	Dec	3 200

It has been found that a great deal of the land in the Sacramento Valley, which was formerly considered almost worthless, due to its being adobe, is very well suited to the cultivation of rice, and that a very superior quality of rice can be grown. A number of electrically-driven plants have been installed for the irrigation of this tract.

As it is necessary to keep the land flooded for about 90 days, the revenue during the months in which they operate is quite high.

CITY WATER SUPPLY

Nearly every one of the smaller towns and cities in the West now uses electric power for pumping the water used for domestic purposes. In many of the towns the same pressure is used for fire and domestic service, so that it is impossible to differentiate between these uses, although additional pumps have been put in permanently for fire purposes. This causes an apparently very low load-factor.

In one of the cities where water is supplied by a power company, the plant is so designed as to take advantage of the valley in its load curve.

It is difficult to make any typical analysis of the conditions which will be of general interest.

CITY SEWAGE PUMPING

In Sacramento, Cal., central station power is used for pumping sewage and flood waters to the river by motors of 1297½ horse-power, the rated capacity of the plant being 2430 horsepower. The ultimate capacity of this plant will be 26 000 000 gallons per 24 hours, and as the installation is quite recent, in operation about April 1st, we show a few illustrations herewith. There are two 350-hp, 2200-volt, 3-phase, 60-cycle vertical motors, direct-connected to three 36-in Worthington sewage pumps, two 110-hp vertical motors direct-connected to a 22-in sewage pump, and three small motors driving compressors and pumps.

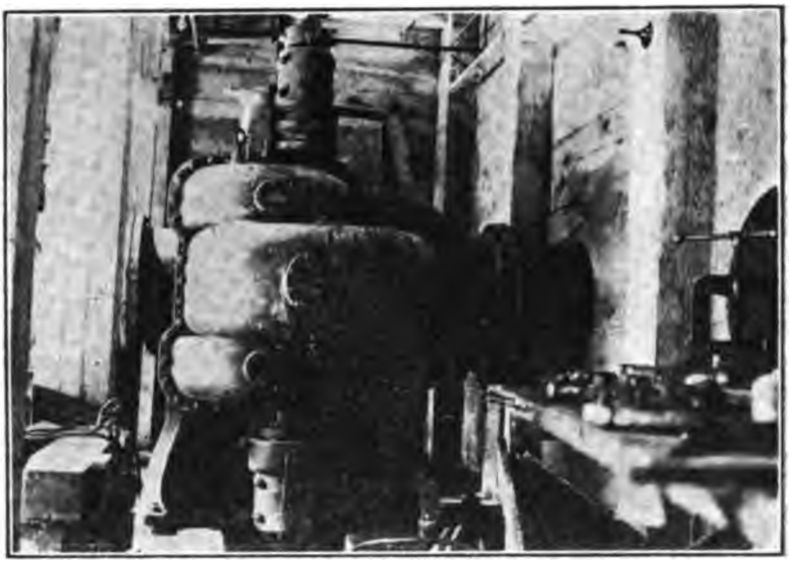

FIG 13—SACRAMENTO SEWAGE PUMP VERTICALLY DRIVEN

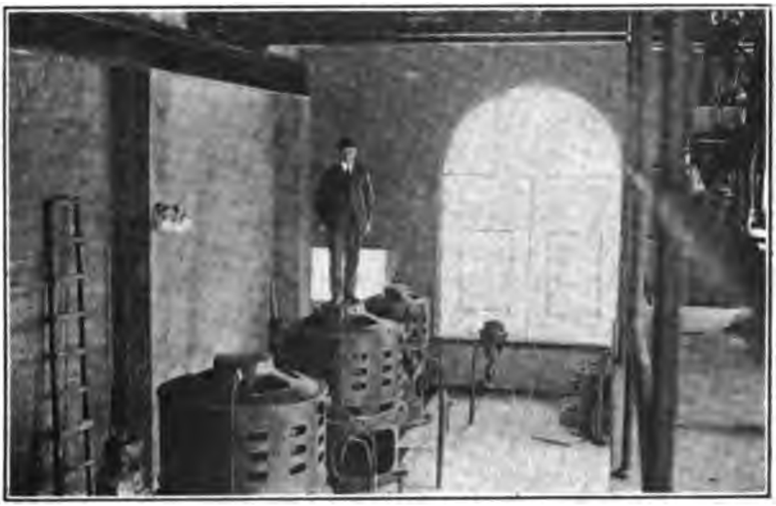

FIG 14—SACRAMENTO SEWAGE PUMP MOTORS

SUCTION DREDGING

The suction dredge consists essentially of a hull on which is mounted a centrifugal pump, the suction of which is connected through a flexible joint to a pipe, suitably mounted, so that its open end can be raised or lowered. At the open end of the pipe is the cutter, which consists of a hood formed of a series of knives; this is revolved and cuts the material on which it rests and mixes it with the water, the mixture being drawn into the open end of the suction pipe by the pump and delivered into the discharge line through which it is conveyed to its final destination. The swing winch moves the suction end of the dredge from side to side, the dredge being pivoted on a "spud" at the opposite end.

In one particular typical case the dredge is operated by electricity supplied from the 11 000-volt, 3-phase, 60-cycle line of the Pacific Gas and Electric Company. It is engaged in filling in land and in levee building.

The power is supplied from 11 000-volt armored shore cable through disconnecting switches and an automatic oil-switch mounted on the dredge, to three 300 kv-a oil-cooled transformers which step the voltage to 2200 volts for the motors.

The main pump is driven by a 2-speed induction motor which is rated 750 hp, 300 r p m, and 625 hp at 257 r p m; this is direct-connected to a 20-in centrifugal pump.

The suction dredge is called on to pump through different lengths of pipe, which means that with long lengths the pump has to work against a greater head on account of the greater friction loss in the pipes. For this reason, the 2-speed motor is used to give a higher head when pumping through long lengths of pipe, whereas the low speed is used with short and moderate lengths of pipe, thereby keeping the velocity of material within proper limits, and keeping down the power consumption when pumping for short distances.

The cutter head is driven by a 150-hp, 600-r p m variable-speed, slip-ring type induction motor, and the swing winch, by a 35-hp, 600-r p m variable-speed, slip-ring type motor.

The priming pump is driven by a 10-hp, 1200-r p m, 220-volt motor supplied from two 5-kw, 2200 to 220-volt transformers which also supply the light.

A period of five months' operation showed a total kw-hr consumption of 551 900 kilowatt-hours; total material moved, 803 000 yards. This material was moved 300 to 900 feet and elevated from 15 to 25 feet above the surface of the water in which the dredge floated. The depth of digging below water line was from 15 to 25 feet. The material handled was mostly sand.

Electric operation eliminates two firemen and two engineers per 24 hours. Maintenance, repairs, loss on lubricating oil, waste, etc, are much less with electrical equipment, and all boiler trouble is eliminated.

CEMENT MANUFACTURING

Electric drive is extensively used in cement manufacturing and the fact that its use is steadily increasing in this industry affords the best evidence of its economy. It is estimated that about 225 000 horse-power capacity in electric motors is installed in the cement plants of the country. A number of old plants have been changed over to electric drive within the past few years and the majority, if not all, of the more important recent new installations have adopted individual motor drive. Of the cement manufactured in the West, it is probable that a larger proportion is made in electrically-driven plants, and a considerably larger proportion in plants served with central station energy than in any other section of the country.

The principal advantages of the electric drive are as follows:

> (1) Maximum flexibility in arrangement of plant. The raw materials used in the manufacture of cement ordinarily represent a small part of the total cost. Power cost is always a comparatively large percentage of the total cost and the productive economy obtained from the machinery used is of essential importance. In plants driven through line shafting and belting from main prime-movers, considerations of economy and convenience of power transmission necessarily determine the arrangement of the plant to a greater or less extent. With electric drive, the plant can be arranged solely with reference to cheap handling of material and convenience and economy in the operation of the equipment.

(2) The capacity of any part of the plant can be readily increased.

(3) Maximum economy is obtained in the distribution of power. Friction load of belts and bearings and cost of repairs and maintenance are reduced to a minimum. Stoppage of large portions of the plant and loss of production, which result from troubles with main shafts and belts, are eliminated.

(4) The speed of every machine is more steadily maintained at the proper point under all load conditions, frequently resulting in a more uniform quality of product and in considerably increased production.

(5) Economy in power consumption is maintained when the plant is operated at reduced capacity.

(6) The elimination of a large amount of shafting and belting reduces danger of injury to employees.

(7) By means of electric meters, automatic and accurate records can be obtained of the energy consumption and variation of power demand in any part of the plant, and abnormal operating conditions in the equipment can be easily and quickly detected.

(8) Central station power may be utilized, thereby frequently effecting a further direct saving in power cost and obtaining all of the incidental advantages which are derived from the use of purchased power as compared with the installation and operation of an isolated power plant.

From the standpoint of the central station, cement plants afford very desirable power loads. Energy is required in large amounts, most of the plant is in continuous operation, the power demand is fairly uniform, and the load-factor is unusually high.

In one Portland cement manufacturing plant, raw materials are obtained in electrically-operated quarries, about three miles distant, and are transported to the mill by steam power. The rated capacity of the plant is 9000 barrels of cement in the finishing mill and 6000 barrels of clinker in the raw mill per 24 hours. The actual average monthly output of cement during the year is 98 826 barrels, the mill running continuously most of the year. The total connected horse-power is 10 979.5, the power supply being 3-phase, 60-cycle, the larger motors operating at 2200 volts and the smaller at 440 volts. This plant contains two 800-hp motors operating compressors, several 250-hp and several 150-hp motors. The kilowatt-hour consumption per month varies from 402 000 in January to 2 196 000 in April, 16.7 kilowatt-hours being consumed per barrel of cement manufactured.

In another California plant with a rated capacity of 2 372 500 barrels of cement per year, the actual output for 1912 was 1 300 000 barrels, the total connected horse-power being 8900 and the maximum demand on a five-minute peak being 5300 kilowatts.

SUGAR REFINERY

We give below reference to an interesting sugar refining installation.

The raw sugar for this plant is received in ships from the Hawaiian Islands in sacks and is taken by conveyor to the factory and dumped into bins. It is then mixed with syrup to dissolve the syrup which adheres to the grains. The syrup is separated from the sugar by machines called "centrifugals," which much resemble the centrifugal dryers used in laundries. These require about 35 horse-power in starting, but only about 7½ horse-power in operation. As a result group-drive is used, 11 machines being driven by a 150-hp motor. The water which has been used to wash the original bags and the bags that have been used in the bag filter, is then added to the syrup, which is then again filtered and melted by steam. Either exhaust or live steam is used, usually the former, as there is still considerable steam power required. It then passes through a bag filter and a bone char to the vacuum pans where it is evaporated. This process is merely a process of nursing crystals until they reach the proper size. A large amount of live steam is used. About 3500 horse-power in boiler capacity is required. Exhaust steam was formerly used for this, but it was found that a better crystal could be obtained by the use of live steam. It is then passed through more centrifugals which remove the liquor which is returned to the vacuum pans. From here it is passed through a sweater, which is a long revolving drum in which are steam pipes and through which air is drawn by a fan, through the granulator, which removes the remaining moisture and on through the sort-ing screens to the packing room. Both of these processes require 20 horse-power.

As the plant is situated on the bay, salt water is used for condensing purposes, about 5 000 000 gal per day being required which is furnished either by two 100-hp and one 150-hp motor-driven pumps or by steam pumps. Fresh water is brought to the plant in barges and can be pumped into the tanks either by steam or electricity, about 50 000 gal per day being used.

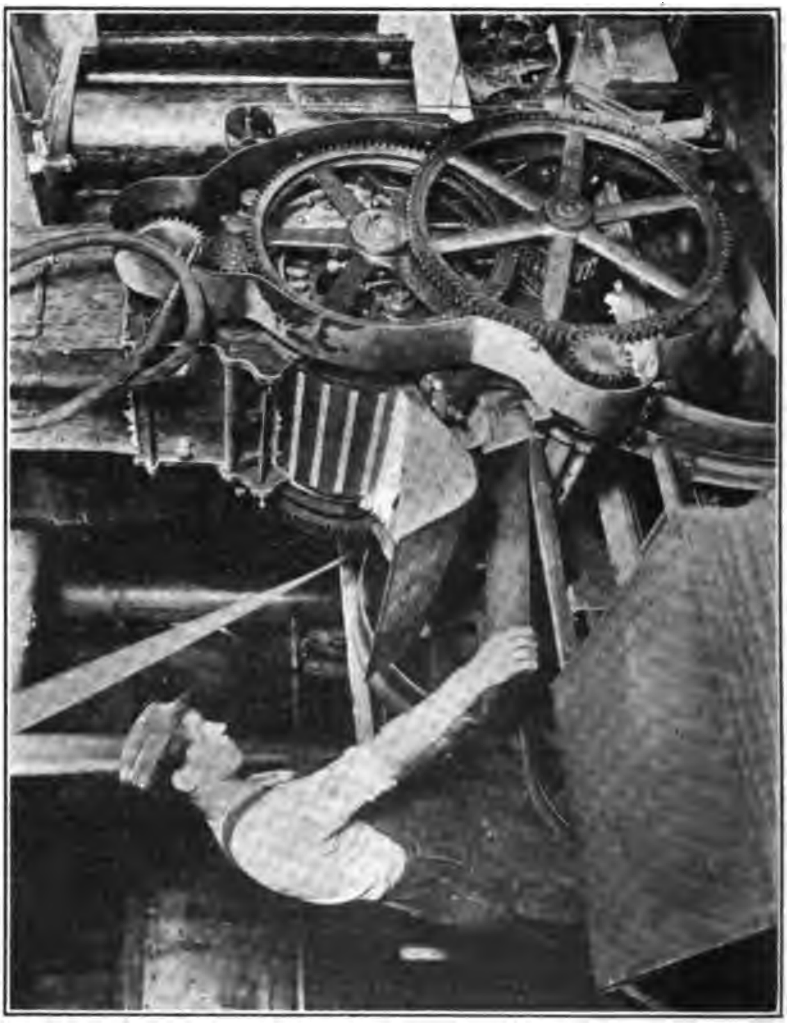

Fig 15—Sugar Cube Machine

The number of steam or electric pumps operating is dependent upon the amount of exhaust steam used. Under ordinary conditions the pumping is done by electricity, as sufficient steam is furnished by the steam units in operation, which consist of the following:

One—250 hp engine driving 33 centrifugals
One—100 hp " " vacuum pumps.

About 50 horse-power in direct-acting steam pumps are used for pumping syrup.

There are now installed 2452½ hp in motors, which include 330 hp that are used only in case of accident to their own engine. There are 550 hp in pump motors, 67½ hp in the laundry, 190 hp for air compressors, 408½ hp for elevators and conveyors, 75 hp for sweaters and granulators, 20½ hp for sewing machines, 325 hp for centrifugals, 57½ hp for blowers and exhausters and 328½ hp for miscellaneous uses, such as shops, concrete mixers, etc.

The plant operates continuously for about ten months, and but very lightly for about two months per year. While running their output is about 900 tons per day. Their maximum fifteen-minute demand for last year was 984 kilowatts. The small consumption during the earlier months of last year was due to the fact that in July the installation was nearly doubled.

RUBBER MANUFACTURING

At Pittsburg, Cal., electric power is used for manufacturing all lines of mechanical rubber goods, generally hydraulic and rubber hose. Rubber is shipped in from Mexico and South American ports and supplemented by rubber reclaimed at the plant from old bicycle and automobile tires. The installation is 33 motors, aggregating 1112 horse-power, consumption from 51 840 kilowatt-hours in October to 195 840 kilowatt-hours in April.

WIRELESS

One of the large Trans-Pacific wireless stations of the Marconi Company is supplied by central station power. This is fed by an 11 000-volt line and stepped down to supply two 500-hp frequency changers, two 25-hp motors driving com-

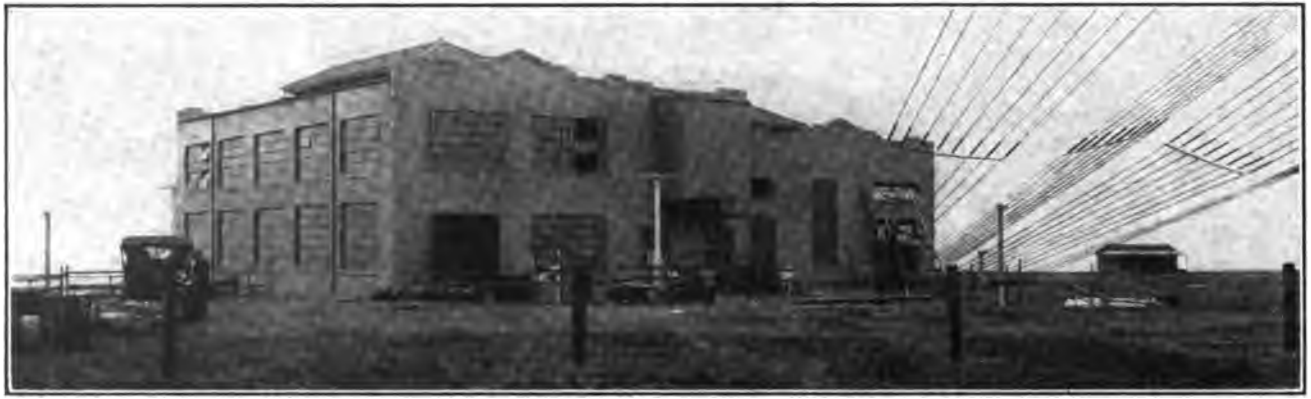

Fig 16—Exterior of Wireless Station

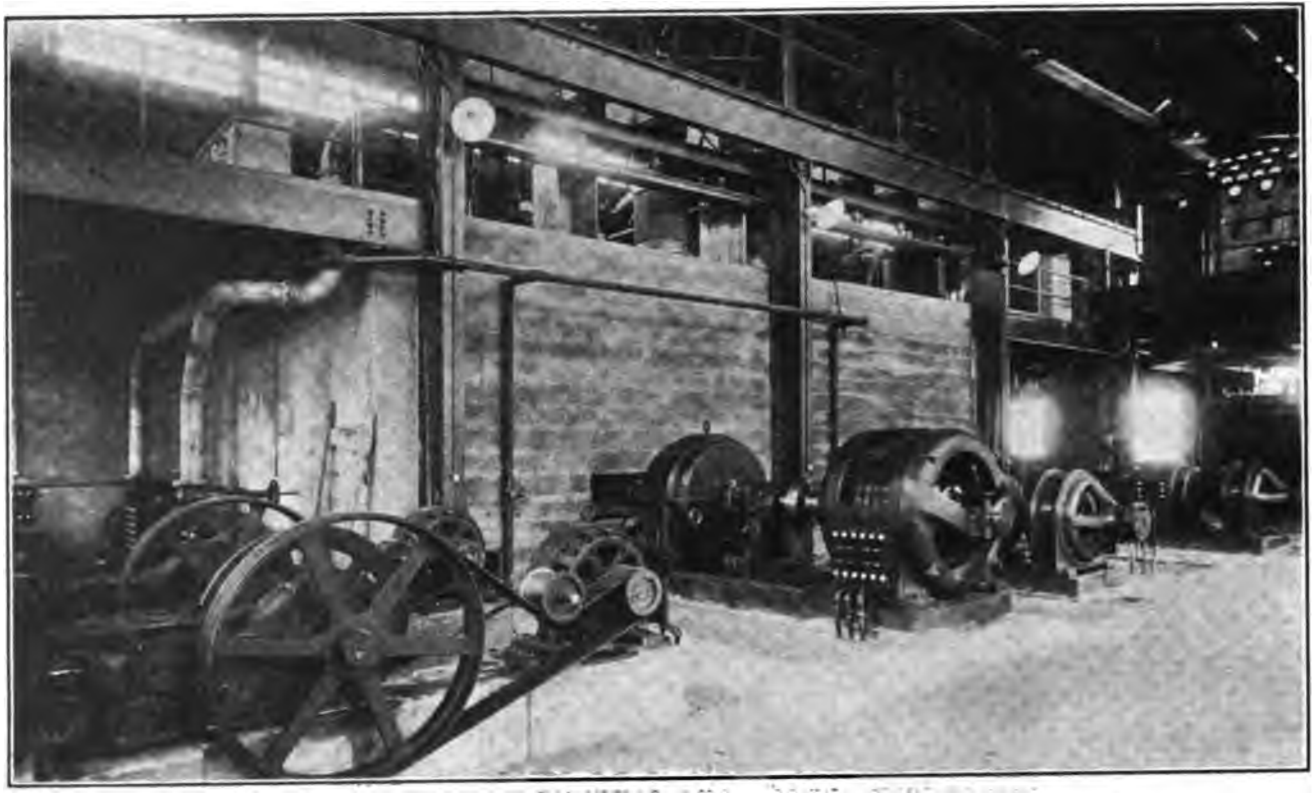

Fig 17—Interior of Wireless Station

pressors which supply air for cooling and regulating the discharge, two 115-hp motor-generator sets which supply direct-current for the excitation of the motor generator and for the control circuits, two 3-hp motor-generator sets for the operation of signal circuits and some incidental power and lighting. All the working portion of the plants is in duplicate, so that but one each of the motors is in service at one time. Twenty miles away is the operating station where the operators transmit and receive messages. The receiving aerial system is located here, but in order to escape the direct influence of forced waves from the transmitting apparatus while receiving, the latter is located at the power house. This plant has been in operation but a short time, the kilowatt-hour consumption per month being at present somewhat in excess of 50 000.

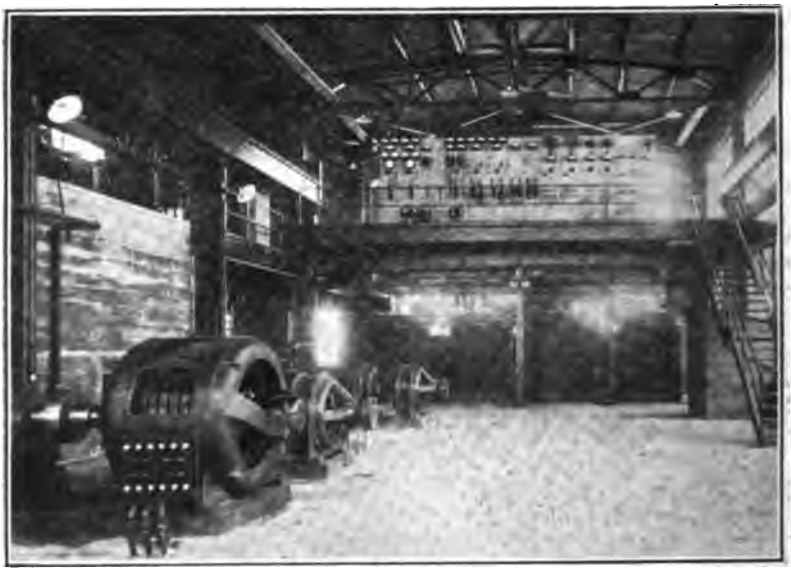

FIG 18—INTERIOR OF WIRELESS STATION

RAILWAY SIGNALING

The double track system of the Southern Pacific between Benecia and Sacramento, a distance of about 57 miles, is protected by a signal system operated by central station power. At a point on the line a generator of 18-kw capacity at 50 per cent power-factor is installed, driven by a 25-hp 3-phase motor. The generator is wound for 4400 volts, 25 cycles. This operates 77 signals, the motor input being 18.8 kilowatts, which is carried on a single-phase line to the different semaphores where it is stepped down to the different voltages needed. There are usually six taps on the secondary of the transformers ranging from 4½ to 110 volts.

When a train enters a block it short-circuits the rails which are insulated at each block. This causes both arms to go to the danger position. When the train passes from this block, the rails are no longer short-circuited which allows a relay to act throwing one arm into the safe position. When the train passes from the second block, the first arm of the second semaphore going into the safe position actuates a relay which closes a circuit that throws the second arm of the first semaphore to the safe position. Thus a train approaching the first semaphore is advised as to whether a train is in either of the next two blocks, and if so which one it is in.

So little power is required for the operation of one of these that it is scarcely noticeable on the instruments in the substation. As a result this is practically 100 per cent load business. It has also proved very satisfactory to the railroad as it has been possible to dispense with the services of several men, and also do away with the very considerable investment in batteries and with their attendant upkeep.

Following are the kilowatt-hours for a year by the month:

Jan	14 440	Apr	15 240	July	15 520	Oct	12 640
Feb	14 600	May	14 800	Aug	14 160	Nov	12 160
March	13 040	June	14 600	Sep	14 720	Dec	13 120

From this it will be seen that the yearly load-factor is 97½ per cent.

ALFALFA MEAL MILLS

Alfalfa is extensively grown in the West and is especially profitable when grown by irrigation. While the greater portion of the crop is fed to stock in the form of hay, a large amount is now ground into meal and used as feed for poultry and for all kinds of farm animals. A number of alfalfa meal mills have been built in the principal alfalfa districts and many of these are operated with central station power.

The process used is simple but requires a comparatively large amount of power. The alfalfa hay is fed into a machine similar to a feed cutter, which cuts it into short lengths. It then passes into the grinder where it is ground into meal sufficiently fine to be drawn off through a screen by an exhaust fan and is blown into a hopper, whence it flows by gravity into the packers.

Fig 19—Alfalfa Meal Mill

The equipment used in one of these plants is as follows:

1—Drag conveyor, 36 in wide by 12 in deep by 40 ft long, for conveying the alfalfa hay to the machine
1—Combination self-feeding alfalfa cutter and grinder, nominal capacity, 3 tons per hour
1—No. 40-E American blower, 1380 rpm
1—No. 36 Niagara collector
2—Meal packing machines for 85 to 100 lb sacks

This equipment is belt-driven by a 100 hp, 8 pole, 2200 volt, 60 cycle, 3 phase, squirrel cage motor.

In the course of three months' operation, during which time the plant was operating intermittently, a total of approximately 900 tons of alfalfa meal was produced with a total energy consumption of 15 130 kilowatt-hours, an average of 16.8 kw-hr per ton of meal.

CONCLUSION

Your Committee has in connection with preparing the above matter, also accumulated a considerable number of data which have been turned over to the Salesman's Handbook Committee of the Commercial Section for use in connection with future issues of loose-leaf sheets. Pending the use of the data in this manner, those who are interested in any of the particular classes of business referred to herein are requested to communicate with the Salesman's Handbook Committee for further detailed information.

In dealing with this subject, questions of company policy, rates, source of power supply and methods of getting the business have not been treated, as it was felt that it is more important to present in this report information more general in character concerning the notable and characteristic installations that have been obtained in our power sales development work.

VICE-CHAIRMAN CALLAHAN: This is a very interesting portion of the Sales Bureau work and it should bring out active discussion.

DISCUSSION

MR. C. H. STEVENS, Brooklyn: I was very much interested in Mr. McDougal's report, and particularly so in the part where he referred to the sugar refinery. I would like to ask him what the yearly load-factor of this business is, and what rate they are buying current at. I would also like to know what is the minimum steam pressure at which they can run their boilers for supplying live steam. I would also suggest that this material be turned over to the *Handbook* Committee as soon as possible as it is very valuable and should be put into circulation.

MR. MCDOUGAL: The yearly load-factor of the sugar refinery is very high for about ten months of the year, after which it is practically closed down for two months. During the time that it is operating the monthly load-factor will approach 60 per cent. In regard to the minimum boiler pressure that it is possible to use, I can not answer that question as the same boiler pressure is used in the plant referred to as was formerly on account of there still being some steam driven machinery in the plant. The boiler pressure is about 110 pounds.

Mr. Stevens: Did this particular sugar refinery have a power plant in the first place?

Mr. McDougal: Yes. The electric installation amounts to about 170 horse power, not entirely replacing the steam plant. The plant has increased in size since they began to use electric power, and a large portion of the steam plant has been replaced by electric drive.

Mr. Stevens: Would you care to say what the rate earned is?

Mr. McDougal: I do not recall what the rate is. If you will come up to the office I shall be very glad to give it you.

Mr. Robert H. Knowlton, Philadelphia: I would like to know what two months of the year they are closed down, and also what was the chief economical reason for the purchase of the power in view of the fact that they had to have 4500-hp in boilers.

Mr. McDougal: The chief reason for the purchase of the power was that it is cheaper to buy power than to generate it if exhaust steam can not be used and we have been able to prove that to them. Since they have found that such a superior grade of sugar can be made with live steam they do not use the exhaust steam in the vacuum pans. The closing down for two months is largely I think on account of their not receiving any sugar during those months from the Islands. Just why that is I do not know unless the mills are of such size down there that they finish up their crop in ten months. It is necessary in any case to overhaul the plant, and one month is given entirely to this work.

Mr. Knowlton: Which two months is the plant shut down?

Mr. McDougal: I think December and January, although I am not certain. I shall be glad to look that up for you.

Mr. Stevens: Did I understand you to say they make a superior grade of sugar by using live steam in place of exhaust?

Mr. McDougal: Yes. In the vacuum pans the sugar is crystalized. The process is very similar to that which many of us used in college in nursing a crystal. They continue feeding in strong liquor until the crystals refuse to grow any larger, and they have found by using steam at a higher temperature that they make a better formed and firmer crystal.

Mr. C. I. Weaver, Jackson, Michigan: What kind of sugar is that, beet sugar or cane sugar?

Mr. McDougal: It is cane sugar.

Mr. Weaver: We have in Michigan a number of factories that manufacture beet sugar. They operate about three months in the year, starting in October and running during October, November and December. I have been carrying on investigation as to the advisability of taking on some of that load. There is one condition in beet sugar factories that may not exist in cane sugar factories. In beet sugar factories they use a very large quantity of water to convey and wash the beets. The pumps used for this water are direct-acting pumps requiring somewhere between 125 and 175 pounds of steam per indicated horse power. A very remarkable saving can be shown on a rate simply on the basis of coal alone. They pay there approximately $2 or $2.50 per ton for West Virginia coal. The shortness of the season, however, has been a great drawback, and the time at which this load occurs, in the fall of the year, is practically when our other load is heaviest. The saving on electric power over coal alone could be made with a rate of about one cent per kw-hr. The load would be for 24 hours a day, every day in the week for the three months that the plant is operated. I am wondering if they use any of those pumps in a cane sugar factory.

Mr. McDougal: They require a great deal of fresh water which they have to ship in on barges as their plant is situated on salt water. The sugar comes to this refinery in a form very similar to the ordinary commercial brown sugar, mixed with a little molasses. They do not have to handle any such large units as in the case of beets. They do have to wash this a good many times, however, and also wash the sacks in which the sugar comes, and the water from this is filtered and the sugar saved. A large amount of water is used, but not in the same way as in the beet plant. The ordinary bucket and chain conveyers are used entirely for conveying the product.

Mr. Learned: I would like to ask what types of motors are used in this class of business, and what effect the power furnished to these large dredging machines described has on your regulation.

Mr. McDougal: I believe at the time we first took the dredge business, when there were only a few of the dredges on our line, that the regulation was affected. I know of one particular case where we had a small power house with a dredge operating from it, and whenever this dredge struck a large boulder it would bring the power house to a stand-still. In the main dredging districts that we serve we have so many dredges that the diversity-factor makes a very constant load. As to the motors, they vary considerably but are usually of the rotor-wound high-voltage type.

MR. LEARNED: You have mentioned the high voltage used and the practice of stepping it down one step. What advantage is there in serving current to customers at 2300 volts.

MR. McDOUGAL: In a great many cases they use 2300 volts direct in the larger motors. Where they do not I think it is for the reason that the system was started some time ago when people were not very willing to use a high voltage. In our practice it has been found cheaper to do that than to install new transformers.

MR. R. L. LLOYD, Philadelphia: I would like to know the method of securing and charging for business of this kind, whether it is all short service or demand charge, or, for instance, like a service you give for 24 hours a day, 365 days a year, use it or leave it.

There is no mention made in the report of ice plants. Has there been any effort made out here to secure that class of business?

MR. McDOUGAL: In regard to the rates, in California you will find almost any sort of a rate you want to look for. In the case of the dredges it is a flat kilowatt-hour rate, with a minimum charge.

In regard to ice plants, we have some ice plants out here, but most of them are small. There are a few in Oregon and Washington that are larger, but through the loss of some data, which went astray, this information could not be used for the report.

MR. S. M. KENNEDY, Los Angeles: For the benefit of one of the gentlemen who made inquiries I will say that if he can take time to come down to Southern California we shall be glad to show him three or four beet sugar refineries operating under conditions similar to those with which he is familiar. The value of that load is largely determined by the diversity factor. In Southern California our sugar refineries start in a little earlier than in Michigan, about August. We would be very glad to give full information on the subject.

MR. BUSHON: One of the finest examples of business growing out of competition has been overlooked, and that is the use of electricity in the oil fields. In 1909 there was no use made of electricity for this purpose. At the present time one company alone is using 6000 horse power in the oil fields. It would pay us all to look into this branch of the work.

VICE-CHAIRMAN CALLAHAN: I will call upon Mr. McDougal to close the discussion.

MR. MCDOUGAL: I do not think I have anything more to offer.

VICE-CHAIRMAN CALLAHAN: This subject will be continued Friday morning. What shall we do with the report. The Chair will entertain a motion that the report be accepted.

(Motion made, seconded and carried)

The next number on the program is the report of the Committee on Merchandising and Recent Developments in Electrical Appliances, by Mr. R. R. Young of the Public Service Electrical Company, Newark, New Jersey.

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REPORT OF COMMITTEE ON MERCHANDISING AND RECENT DEVELOPMENTS IN ELECTRICAL APPLIANCES

DIGEST

MERCHANDISING

The section on Merchandising Methods is an effort to present in detail a system for securing the best results in merchandising. The central station problem is to supply existing demands, to create new demands, and then to supply them.

To get maximum sales with minimum sales cost it is necessary to analyze the market in three ways. From a financial standpoint customers are rich, families with average income, and the poorer class. One may thus determine in advance of advertising or sales effort where special effort should be directed to insure the best returns.

A second survey of the market, from the psychological point of view, should give the probable attitude of mind or degree of education concerning electrical appliances of each group toward which sales effort is directed. There is a great difference between willingness to use a luxury and actual need of a labor-saving device.

A third study of the market should prove the need of a card file showing the possible customers and every appliance on the lines. This will save repetition in sales effort and assist in the direction of progressive sales work.

Everything which creates a desire for electric appliances can be called a factor in creating a demand.

We have considered in some detail eight of the factors, as follows:

First Concerning results from national advertising by manufacturers, we urge central-station co-operation.

Second Local newspaper advertising is often expensive. It must be educational, and may be slow in getting results, more particularly in the East, where fewer houses are wired.

Third Show windows are an important sales help.

Fourth Circularization and use of the mailing lists are most important. If you have been thorough in the analysis of your market your mailed appeals should go straight home. Variety in type of circulars is recommended. Occasional educational booklets on the use of electrical appliances are valuable. Consider manufacturers' folders before printing.

Fifth Each demonstrator and salesman should be an appliance enthusiast. Have your store clerks use electrical appliances in their homes. It will give them actual knowledge of the appliances, increase their enthusiasm and add fervor to their recommendations. Salesmen should be taught that every sale should lay the foundation for another.

Sixth Devices in successful operation help to sell others.

Seventh Dealers are an adjunct to your advertising department. A dealer's established reputation will carry the impression of quality and standard use.

Eighth Miscellaneous sales schemes must vary according to the spirit of the community served. A few selling methods that have succeeded in special cases are listed.

After the manager has chosen his sales schemes to suit his own market, he must make a careful survey of his organization. The recommendations under this topic are made to apply to either the small or large company. One person should be responsible for the success or failure of the appliance department whether it be in a small company where there is not enough work to occupy all of one person's time, or in a very large company where the work requires an organization. This one should be held responsible for the efficiency of all helpers and he should know at all times the department profit or loss.

All records should be kept separate from other branches of the business. An accounting scheme is offered listing expenses under (1) Buying expenses, (2) Selling expenses, (3) Delivery expenses, (4) Management expenses and fixed charges, (5) Losses from bad debts, (6) Interest. Companies must expect to lose money at first, but should keep appliance sales accounts separate from current consumed accounts.

On the question of the efficiency of inside sales people we offer some suggestions as to common reasons for inefficiency, and make five recommendations for handling retail clerks:

(1) Base salary on gross volume of merchandise sold
(2) Base advances on gross business plus co-operative ability
(3) Create a belief that there is a future in the work
(4) Employ people who will become successful
(5) Insist that the manager put enthusiasm into this work.

The display of merchandise in the salesroom is a factor in success. The salesroom should be just large enough to hold comfortably the average number of customers.

We assert the necessity of inventories as showing value of stock, turn over, physical condition and unsalable items, and suggest various systems depending on volume of business. We recommend the bin system as insuring order, system and the least deterioration of goods. We offer the rules of the National Credit Men's Association for determining the year's expenses in the department.

The regular lighting solicitors should sell appliances on a commission and in most cases the lighting solicitors use appliance-selling arguments to induce people to wire their houses.

Repair service is very important. Special bins should be marked, "Rush to-day." "Awaiting parts from manufacturers," etc. Central stations should keep on hand stocks of the elements guaranteed by manufacturers.

The instalment plan of selling is important in that poorer people can purchase appliances. The lighting company knows its credit risks and has an easy system of collection in connection with monthly bills.

We enumerate many leaks and losses that can impair the efficiency and lessen the profits of this department. This list is recommended to the attention of every manager.

The problem of campaigns is considered at length. We list appropriate campaign efforts for every season of the year. The length of each campaign must be gauged by results and by the enthusiasm of the sales force. The co-operation of retail stores may be most valuable if retailers are willing to follow the general plan mapped out by the lighting company. During special campaigns or special sales at reduced prices, the telephone can be used to advantage. Special pamphlets have been prepared by the American Telephone & Telegraph Company giving the methods of this plan. Though each campaign will probably show a loss, it will be found as a rule to have a stimulating effect in business done on other merchandise.

A lead system is recommended where every employee will turn in inquiries in reference to the uses of electricity, appliances, complaints of service, etc., as a means of increasing the company's customers by giving prompt attention to complaints.

A few last words on the function of the buyer as interpreter close this section of the report. He must supply existing demands and plan to supply latent desires which will become active through his educational efforts. He must in all cases purchase reliable appliances but should interpret quality in terms of what the majority of his customers can afford.

ADVERTISING

The spirit of our report on advertising is conveyed in the opening words: "Can you think of buying a fountain pen without thinking of Waterman's — of buying a watch without thinking of an Elgin, Waltham or Ingersoll watch? Probably not. Advertising did it."

Everyone is susceptible to the power of suggestion, women especially. An advertising message on household appliances is planned for the education of housekeepers, the majority of whom do not yet understand the uses or advantages of appliances. Advertising must educate housekeepers to the point of familiarity, and then to the desire for possession.

Co-operation between manufacturers and central stations will eliminate waste effort and expense. A seasonable schedule is suggested outlining appropriate advertising to accompany special sales efforts of succeeding months. The labor and expense should be shared by manufacturers and central stations. Manufacturers in magazine advertising should refer the reader to "Your Electric Light Company" for details or for actual purchase of articles described.

Bill-boards, trolley cards, newspapers and direct appeal by mail are considered. The appeals by mail are most valuable as they reach the people who use current. The value of any form of advertising depends on the time and attention it secures.

The advertising plan and its execution should be the work of one man who realizes that advertising is salesmanship on paper. His plan and financial estimate should be prepared at the opening of a season or a year. The plan should be founded on a careful preliminary study of the people to be reached, their probable attitude toward the article to be sold, selling points of the article, and the best type of literature to present these points. Then the advertising must inspire action.

A complete card file and mailing list are preliminary essentials. The card file should list all appliances owned by customers, should be accessible to both selling and advertising departments, and kept up to date.

All advertising is educational. Its effect need not be immediate. There is a cumulative value in a repeated message that should not be hastily overlooked.

SHOW-WINDOW AND INTERIOR DISPLAYS

The store-front and the show-window are considered by the public to be the outward expression of the store policy. People prefer to trade in an attractive shop.

All details of show-window construction, both exterior and interior, should be carefully chosen. Details of type and dimensions are recommended and various plans for window ceiling, background and floor are suggested.

The illumination of a show-window is of especial importance because the mind of the observer is freer at night than in the bustle of the business day, because the drawing power of the window is greater on account of the contrast between the window and the darkness outside, and because a well-lighted electric station window should be an example to all other merchants of the attracting power of good light. The principles of window-lighting are discussed, and detailed suggestions are given as to concealed light, avoidance of reflected light, amount of light and switch control.

Window fixtures are a necessity. Metal and wooden fixtures, pedestals, standards and plateaus should be provided in various sizes and heights, as well as circular shelves, portable platforms and metal card-holders.

Decorative material, such as velour, plush, sateen or silkaline must be supplied to give depth and color to the display, and artificial flowers and foliage will make an appeal that may attract the indifferent eye.

Too much economy in appropriation for display materials may weaken a window's selling force. Variety in succeeding displays is needed for fresh appeal. The fact that a show-window is to sell goods should not be forgotten in an attempt to create a pleasing picture.

The selling "punch" should never be sacrificed.

The "full" and "unit" methods of window-dressing are discussed in detail and the unit method recommended because it enables each appliance to tell its story of use.

Variation of light effects by the use of colored lamps and spot-lights, an electrically operated turn-table, and an automatic device for showing a succession of show-cards, also attract.

Window displays showing living demonstrators operating appliances have a proved value. Suggestions for several such displays are made. Framed photographs of devices installed in homes and offices have a good selling appeal.

A calendar of displays for every month is given, with suggestions for attractive coloring and special decorative features.

A scientific knowledge of color harmonies is necessary for artistic and effective results. The principles of "harmony of analogy" and "harmony of contrast" are explained, and the rules and reasons of successful color appeal are given in detail.

Practical suggestions are made for the preparation of show-cards, their style and lettering.

If all the care suggested for window displays is also used on interior displays, the customer, once attracted into the store, will be in good mental condition for the success of the selling appeal of the interior show-cases as well.

SELLING FORCE

Every citizen in the community is a customer or a prospective customer. Sincerity on the part of the firm is the first step. The salesman must gain his confidence and this can only be done if the salesman knows that he is selling the right goods at the right price.

Electrical appliances will not sell themselves. In entering the merchandising field we must copy the work of the up-to-date department stores and give prompt and satisfactory service. We need careful self-analysis to establish service of this modern type and must then evolve a set of rules for our guidance.

Sales people should be high-school graduates, young, neat and clean, cheerful and courteous, speaking English well and fluently. They must understand that the company's policy is to satisfy the customer and hence should know the practical operating facts about all appliances. There should be regular meetings conducted by the heads of sub-departments for instruction on the mechanical construction of the merchandise, with frequent demonstrations as to the actual operation.

A very successful plan for training in sales methods is to hold a sales demonstration fortnightly. The manager should post the problem for consideration on the bulletin board a few days before the demonstration, that all may think it over. At the demonstration meeting one salesman is suddenly chosen to work out the problem, which may be the sale of an electric iron to a housewife, before the whole class. At the end of his attempt examination papers should be passed to all present with questions which will lead to constructive criticism on the work just witnessed.

As to payment for the salesman, he should be paid enough to enable him to live comfortably. The amount depends on living conditions in the city or town in which he is employed. In addition to a salary there should be a commission or bonus plan dependent on the gross profit in the line of goods for sale, and the importance of the current revenue should not be overemphasized.

We make detailed suggestions as to estimating sales expenses and salary percentage on the expected volume of sales, with the caution that no bonus system should be allowed to encourage a salesman to sell to a customer something he does not require. on account of its current-consuming ability.

We recommend that for economy in effort and efficiency in results the merchandising department be placed under the supervision of the New Business Manager.

INDUSTRIAL APPLIANCE BUSINESS

The majority of central stations have ignored the industrial appliance field, feeling that there is not sufficient opportunity to warrant special effort. Of five hundred stations that replied to queries only 5 per cent had made any special effort, but 99 per cent expressed hearty approval of the idea that this class of business should be sought.

Manufacturers are criticised by central stations for the prohibitive price of industrial appliances, and central stations are criticised in turn for the prohibitive rates of operation, and manufacturers further state that the price of appliances cannot be lowered until a greater demand permits cheaper production.

The Committee feels that the example of wonderful increase of domestic appliance business due to co-operation between manufacturers and central stations, points the way to the development of the industrial appliance business.

The results from this business will not be immediate as educational work is slow, but the additional revenue can be obtained with practically no additional investment in lines or station equipment. There will be a steady and increasing off-peak business justifying the development of this business. The largest returns come from manufacturing centers, but every central station has in its territory restaurants, garages, machine shops, etc. A classified card prospect file will show the openings. The possibilities are a challenge to all new business managers.

Since manufacturers' catalogues of industrial appliances are incomplete as to possibilities of use, this Committee has prepared a classified list of industries catered to, with a list of appliances for each industry, and a directory of manufacturers from whom they may be obtained.

The industrial appliance man should be connected with the appliance department under the supervision of the sales manager, and be in touch with power representatives. He should be a technical man of sales ability, with a knowledge of Underwriters' rules, and conditions of insurance rates, and thoroughly familiar with wiring methods.

As most of this business is of a special nature it is impossible to carry samples of all appliances. A sample line of the smaller standard appliances should be carried, however, for display and demonstration.

The Committee wishes to establish a permanent means of acquainting central stations with the work being done in this line. Frequently installations are made the nature of which would be interesting to central stations. *The Electrical Review and Western Electrician,* and the *Electrical World* through their respective Managing Editors, Messrs. A. A. Gray and A. S. McAllister, both members of this Committee, have agreed to cooperate with the National Electric Light Association and all central stations. They offer space in their magazines for the production of articles and data pertaining to all industrial appliances and installations. We recommend that it be a portion of the duties of the next committee on industrial appliances to secure articles for publication in these magazines, and to see that such articles are regularly furnished and published, embodying in their final report a synopsis of the publications made throughout the year.

The Committee appends lists of some successful industrial appliance installations with details of operation of standard appliances installed for special or unusual purposes with successful results, and of some very recently developed industrial appliances. These three lists should be found full of strong suggestive power for the work of new business managers.

RECENT DEVELOPMENTS IN ELECTRICAL APPLIANCES

To supplement the previous section of this report and to bring up to date the information on development of household appliances the Committee has made an effort: (1) To ascertain the needs of the business expressed in definite statements as to the appliances for which central stations found the greatest demand among their customers, and as to suggested improvements or modifications of standard appliances, and (2) to ascertain from the manufacturers how far they have already gone toward meeting the required development, and how far they might be able to go in the future both practically and economically. As a result the Committee sent to manufacturers this letter:

"We find a wide and insistent demand for a general reduction of prices, qualified by the request that the manufacturers so arrange their list prices that a reasonable discount may be given to permit the central stations to conduct the merchandising business profitably. The stations request that additional developments be immediately produced in domestic ranges, branding irons, etc., etc.," appending a list for their consideration.

The manufacturers used much time and care in preparing detailed answers concerning development in efficiency to date, present price rates, future possible development in efficiency, and future possible price rates.

The Committee has compiled the answers from the manufacturers and gives in this report a list of many important appliances for household use. With a description of each appliance we give the judgment of the manufacturers as to the present situation and future outlook regarding developments in efficiency and maintenance or reduction in price.

The general tone of all these replies is that improvements are being made constantly, and that with increased demand prices are falling as rapidly as is consistent with maintenance of quality.

PREFACE

Your Committee sent out a list of questions to 659 central stations throughout the country and received approximately 200 replies, to determine the number of companies selling electrical appliances, the amount of sales, the merchandising methods, whether campaigns on special appliances were held at reasonable periods and whether the industrial appliance field had been developed.

Of the 200 companies replying, we found that 25 did not sell appliances, preferring to leave these sales to the dealers and contractors; 53 did not have campaigns or special sales; 132 sold appliances at list prices, and 68 sold appliances at varying profits, some as low as 10 per cent above cost.

On the Pacific Coast practically all of the houses are wired in towns supplied by central station service and electrical appliances are generally sold by both central stations and dealers in the territory.

With the exception of 40 or 50 of the 200 replies received, the information given was so incomplete that it was impossible to get an idea of the real scope of the electrical appliance business throughout the country. Your Committee, therefore, has prepared a report along lines somewhat different from any heretofore presented. We felt that the previous Committees on this subject had covered to a large extent the methods of merchandising employed by a number of companies; also the subject of campaigns had been covered very thoroughly in a number of articles published during the year in the electrical magazines. We believed that a report along constructive and educational lines, which would give a few of the basic principles of merchandising, would be a help to those central stations not selling electrical appliances as well as to those who have gone into the work to a small extent only.

For the purpose of getting information from all parts of the country, your Chairman placed on the Committee an additional number of men, believing that these men would take more interest in the work as members than they would as reporters. Your Chairman also divided the work of the Committee into seven sub-committees, placing a specialist as Chairman of each sub-committee.

Your Committee has not mentioned a large number of the recent developments or improvements in electrical appliances, as nearly all of these developments and improvements have been mentioned in the electrical magazines during the past year. As the Committee felt that the industrial appliance field had not been developed as it should have been and that a research should be made of its possibilities, a sub-committee was appointed on this subject with results so gratifying that the report will not be complete without giving the scope and findings of the investigation. We recommend that the Association appoint a special committee, each year, to investigate this subject further and present a report covering the development and the uses of electrical appliances in the industrial field.

MERCHANDISING

ANALYZING THE MARKET

Communities differ. There is no one best way of selling electrical merchandise. The central station has two problems in selling this class of goods: First, to supply existing demands; second, to create new desires and as these develop into demands, to supply them. The latter come into existence by educating the public to a demand for electrical appliances. Your problem is different from that of the ordinary merchant. Possible customers are limited to the consumers of current.

To sell electrical merchandise at a profit it is necessary to analyze the market. By analyzing you obtain information that enables you to first reduce the cost of creating a demand, second, reduce the sales expense per appliance sold, third, helps to get maximum sales.

In this report we shall check and analyze the market in three ways: First, the customer's financial condition, second, the customer's psychological condition or mental attitude toward goods to be sold, and third, the physical information regarding the devices in operation and the location thereof.

FINANCIAL POINT OF VIEW

You can roughly class your household customers this way:

(1) People who do not use the appliances themselves;

whose household work is done by servants and appliances are not necessarily considered household necessities;

(2) Families with average incomes, the women of the household doing most of the work and buying appliances for their utilitarian value, for their value as conservers of energy and time. This group offers the greatest possible opportunity for successful merchandising effort.

(3) Households in which electric light is considered a luxury and a monthly bill of $1.00 or $1.50 a big item. They appreciate the value of electrical appliances but cannot afford the capital investment or the cost of operation.

The percentage which each of these groups bears to the total number of household consumers of electricity differs with every company. The merchandising man must make an estimate of conditions as they exist in his own locality. This approximation should be used in basing regular sales expenditures and in laying out campaign work. In a community where the electric light customers may be divided into 10 per cent, first group, 50 per cent, second group and 40 per cent, third group, it would be a mistake to spend 75 per cent of the sales effort in endeavoring to reach the first group. Better 25 per cent aimed at Group 1, and 75 per cent at Group 2.

The various lines of electrical goods are manufactured to appeal particularly to one of the three groups. This must be remembered in buying. Base your purchases and estimate your volume of sales upon a knowledge of the percentage each class bears to the whole. As an example, the store manager has $5,000 to spend for portable lamps with three lines, one ranging around $75, one around $15 and the third around $5. With the ratio of customers outlined above, $500 can be spent for the expensive line, $2,500 for the middle-class line and $2,000 for the third line. In actual practice with portable lamps, $1,000 could be spent on the first group, $3,000 on the second group and only $1,000 on the third group.

There are several alternative methods for making this financial classification. The third group is usually found in a definite neighborhood. The customer's ledgers should be checked by occupation or neighborhood. The salesmen should check their sales records from information obtained by personal calls, and divide the prospects into three classes. The type of house lived in, whether apartment or private house should be known. If an apartment, information as to the rental paid can be obtained from the landlord or renting agencies.

PSYCHOLOGICAL OR HUMAN INTEREST POINT OF VIEW

A knowledge of the type of woman representing the average for each class will be of value. This information is particularly helpful in making up advertising appeals, in designing general effect in a display room as a help in buying and in employing sales people who can best handle the trade. Department stores cater to a particular class. All their sales work aims at a hypothetical average woman. They check their prospective trade financially, socially and in some cases on the basis of nationality. For instance, the general appeal made in a Dutch community would be different from the appeal made in a Jewish community, granting that the financial standing of the customers was the same. In other words the appeal is based on the known rapidity of response.

The analysis has been overlooked by the lighting companies. This information can be obtained by interviewing representative women and getting data regarding the use of household labor-saving devices, the size of the family, number of servants, stores traded at, social connections, occupations, and the number of wage-earners in the family. As an example, the type of store traded at is one of the greatest helps. People of the same class trade in similar stores. By getting the methods used by the merchants who sell to the same people the central station wishes to reach, you should have no trouble in giving the proper tone to window display advertising, in lining up the prices to be obtained for your merchandise, type of clerk needed, methods of display and general sales appeal. As an example, an exclusive shop appeal is based on giving the impression of individuality, of items for sale not in common use. The middle-class store selling labor-saving devices bases its big selling talk on the general utility of the appliance, making quantity display and impressing upon customers that they must have the devices to get the most out of life.

Another psychological classification is based on mental attitude.

(1) There are people who know what they want and come to get it. As an example, the woman who wants to make her ironing easier makes up her mind that she wants an electric flatiron, comes to the store and demands that particular device.

(2) There are people who know their wants but do not know what will supply them. As an example, a woman desires to make toast for breakfast, but does not know whether to buy a grill or toaster, or a disc stove with a special wire screen; or who wants to get an electric appliance for a gift, but has not made up her mind what device it shall be. In selling to the first class the clerk is acting as an order taker, and is to a great extent an order taker for the second class.

(3) There are people who enter a store with no particular concrete desires; have not made up their minds to buy or perhaps have already bought one thing, yet have a latent wish for something else of which they are not cognizant. Here is the salesman's opportunity to show real salesmanship.

No sales organization should ever consider that its men are efficient until they can get a big percentage of returns from the type of people described under the heading of Class 3.

PHYSICAL ANALYSIS

It is advisable to know the appliances already on the lines. One way of getting this information is to make a house-to-house canvass and find out the kind of devices in use, from whom purchased, when purchased, and at what price. This information is valuable when the central station starts a merchandising department. By finding out from whom electrical goods have been bought, the appliance manager will know with whom to co-operate. By knowing the price paid he will have definite information in setting his own price schedule. This information is of particular value in a small place where the customer is apt to make his purchases in the near-by cities. Impress upon the men that "sugar is a better information getter than vinegar." Tactful questions make and keep the good-will of the prospective customer and will always bring out the information required. In addition note the appliances in which the customers are interested, for use in advertising follow-up, and as a prospect list for sales work. Record should be kept of appliances out on trial, and all appliances sold should be added to the card record system. The following card form is very satisfactory:

PROSPECTIVE APPLIANCE SALES

Name
Address

Appliance	Serial Number	Consigned Date	Sold Date	Returned Date	Salesman Name	Repaired Date

(6 in by 4 in)

These cards should be filed by streets. A separate card file can be kept of consumers who have moved and are not on the company's lines, or for some reason have discontinued the use of electricity. A certain percentage of these people at some future date will again become consumers of electricity, and a record of the appliances which they have in their possession will be of value.

These record cards should be used as a basis for all sales work. The point of saturation should be noted before commencing campaigns on a given appliance. Sales expenditure should be based on the saturation point. Keep your card records under the direct charge of the appliance manager. This information is of value in circularizing. It increases the percentage of returns by eliminating follow-up work on existing users of the device, and furthermore divides the prospects into groups based on appliances in use. For example, in a vacuum-cleaner campaign it will be found that the users of flat-irons can be followed several times with profitable results. They are more receptive to sales work than are the consumers who use electricity for lighting only. This applies to all other appliances.

FACTORS IN CREATING A DEMAND

Everything which creates a desire for electrical appliances can be called a factor in creating a demand.

The relative importance of the methods discussed below varies in different localities, depending mainly upon the prospective customers' knowledge of electrical goods. This information is obtained by analyzing the market, bearing in mind the devices in use, the customer's attitude toward labor-saving devices, and the financial condition of the average family.

In planning local work, consider also the time-attention that will be given to the different methods. As an example, newspapers are read for a few minutes, weekly papers during a long and the monthly magazines a still longer period. This is technically called the "time-factor." The weekly small town newspaper is supposed to be kept in the home and read until the next issue appears. However, newspapers in small towns near big cities do not have the same "time-factor," due to the local circulation of the city dailies.

The local mediums, such as window displays, newspaper advertising, circularizing, etc., must be analyzed, bearing in mind the many demands on the attention of the prospect.

In creating a demand always use terms that the average woman will understand.

National Advertising by the Manufacturers The large manufacturers of household lines have been advertising for some time. As compared with the national advertising done by manufacturers of other goods, the work is efficient. The mediums used, such as the *Ladies' Home Journal*, the *Saturday Evening Post* and the *Woman's Home Companion* have a large circulation in some of the best homes throughout the country. In a general way the value of this advertising is indirect. A direct return can be obtained if the central station will tie its local work to the manufacturers' national work. (See "Advertising" section of report.)

Local Newspaper Advertising All advertising should be educational; newspaper advertising is no exception to the rule. It is apt to be the first method used by central stations, and is the most flexible advertising medium. Bear in mind that rates for space vary in different cities. The expense of this type of advertising should be carefully checked as the length of time newspaper copy is alive and attracting attention is short. Do not expect too much from a single advertisement. In advertising unknown specialties be prepared for considerable educational work, and do not expect too much from the newspapers. They should be followed by some other means for creating a demand and making a sale. Newspaper advertisements are particularly effective for featuring reductions in price when the original price is well known, and for educating people in a knowledge of your goods so that they will come to your store for further information.

Lighting Company Show-Windows These are a valuable sales help. The big merchants consider their show-windows a powerful element in making sales. One department store gives each foot of the window display a percentage of the overhead charges, and expects certain definite returns from every item shown in the window. Keep your windows clean. Display your merchandise of household goods to please the women-folk. Watch the successful merchants and copy their methods. (See "Window-Trimming" section of report.)

Circularization and Use of Mailing List Every consumer of current is a possible prospect for electrical goods. This mailing list has no waste of circularization. This is an important method for creating demand and should be studied in the light of information obtained from your analysis. Use circulars and mailing matter which appeal to the average customer. Your methods of circularizing should not duplicate those of other merchants.

Maximum results come from appropriate circulars and careful classifying of the general list into live prospects. Better fifty live leads for a vacuum cleaner than 5000 circulars to your entire mailing list.

A word of caution! Do not use too many of the same kind of circulars. Vary the kind of circular and the method of sending, mailing with bills, with form letters and as bill stickers. At times plain circulars or educational booklets dealing with general subjects, not aimed at selling a particular device but designed to create a general knowledge of electrical goods, are effective. Western farmers buy from catalogue houses. A central station wishing to sell appliances would find the cost of sending a salesman prohibitive. Circularizing would be an inexpensive and effective method of creating a demand, particularly in conjunction with the demonstration and display of goods at the local trading centers. Do not order circulars which you may not use. Do not make up folders or booklets when the manufacturers will give you what you want gratis.

Have a rack for holding the circulars to be distributed over the counter. When kept in loose piles many are wasted, and they give the store a slovenly appearance. In distributing make the customer feel that you are giving her a booklet worth reading; that it contains an interesting message worthy of careful consideration. In nine cases out of ten, the customer will base her value of the circular upon the way it is handed to her by the clerk.

Demonstrators and Sales People Every member of the sales staff is employed to sell merchandise. Every person talked to should become interested in at least one new appliance. The salesman who sells one article and does not lay the foundation for another sale is only 50 per cent efficient. The whole organization should help to create a demand for electrical goods.

As the outside salesmen have a big opportunity to help, make it worth their while to talk electrical appliances. They can talk of the value of the different appliances on a more personal basis, as in many cases they are known by the householder and their opinions have considerable weight. They are also of value as "fix-it men." A cord repaired on the premises may mean an electrical flat-iron in use during ironing day.

Have your store clerks use appliances in their own homes. It gives them a better knowledge of the goods, and an opportunity to get domestic criticisms, which make for more enthusiastic salesmanship. A man who has had his morning coffee made by an electrical percolator can talk from experience. The customer will feel the difference. Make it easy for the customer to ask questions. Answering questions intelligently is a form of teaching; it helps to create a demand.

Devices Already in Successful Operation The old saying, "The best advertisement is a satisfied user," applies particularly to electrical goods. In the past an air of mystery has surrounded the electrical apparatus, which has not as yet been entirely overcome. By having the majority of customers using some kind of an electrical device all thought of danger will be eliminated. Every appliance sold will sell one other within a year. Some merchants claim they can afford to lose money on the first sale as the repeat orders offset the loss, provided the appliance was sold clean; that is, to a person who can afford to use it, knows how to use it, and who is convinced that it will do the work the best way. One appliance helps to sell different appliances in the same household. In a middle-class family, the use of an iron increases the knowledge of electricity, and makes possible the sale of an electric percolator with less sales effort.

Dealers Who Sell Similar Apparatus We all know that the point of saturation for electrical merchandise is far from reached. When you consider that every appliance sold has repeat order value the local dealers can be looked upon as a sales asset. They have show windows, do newspaper advertising, have trained clerks and have the good-will of the community, based on a reputation for having served their customers satisfactorily. Furthermore, when the reputable dealers sell electrical goods, it acts upon the prospective customer as a guarantee of reliability and carries the impression of standard use.

A manufacturer of dish-washing machines advertising in the *Saturday Evening Post,* featured the fact that John Wanamaker sells his product. In this case the manufacturer was cashing in on an established reputation.

As long as the retail price schedule agreed upon is maintained, consider any store selling to the women-folk an adjunct to your advertising department. If the dealers should sell 1000 devices, a large percentage of repeat orders would come to your store unsolicited.

In the rural districts it may be possible to get the local merchants to feature and display the items campaigned. This would have the same value as a branch store.

Miscellaneous Sales Schemes There are many good schemes which help to create demand. The idea carried out must be relevant to the work in question. In selling flat-irons stay with this subject. Do not confuse customers with other things not associated. A negative effect should be avoided, and anything which detracts from the general sales plan is negative. One central station designed an electric truck in the shape of a flat-iron and drove this around the city. It was attractive, caused considerable comment and made sales.

The Bell Telephone Company has put out an attractive booklet called "Selling by Telephone" which outlines many telephone sales schemes. Several eastern companies are experimenting with this form of sales service. This work will probably be found most effective when the sales people using the telephone are personally known by the customers.

Many companies make a point of giving talks before women's clubs on the uses of different appliances and their value in the home. With the growth of Domestic Science Departments in the public schools, considerable work can be done there.

One gas company made a point of demonstrating its ranges before church congregations, meeting in the Sunday-school room. The announcement was made from the pulpit.

A novel vacuum cleaner advertisement was to place a carpet on the sidewalk in front of the show-window, with a sign in the window stating that at a definite time the carpet would be cleaned and a prize given to the person who guessed nearest to the exact weight of the dirt removed. Another vacuum cleaner demonstration consisted of driving around the city a truck on which was a colored maid demonstrating the different uses of the cleaner.

The system of giving every employee of the company a lead book in which notations will be made regarding prospects for appliances, people interested in service, complaints, etc., has merit. These lead sheets are to be turned in to the department head and from there distributed to the interested departments of the organization. By this method every employee feels his responsibility as a representative of the company and many sales will result from this informal method of creating a demand.

MANAGERIAL POINT OF VIEW

Modern business methods demand that organizations be separated into departments and particular individuals be held responsible for particular tasks.

Segregation of Responsibility Hold one person responsible for the ultimate success or failure of the appliance department.

There are three classes of lighting companies from the point of view of the sale of appliances:

Class A The small company will not require the entire time of one person. However, one individual assumes the responsibility for profit or loss, and reports to the general manager. Other employees working in this department are under his direct charge. Helpers should be trained, and their time charged to the appliance work when so occupied. The organization should be so arranged that at certain seasons additional salespeople and helpers can be placed in this department. When necessary, outside salesmen can be brought in to work behind the counter.

Class B In cities of middle size the merchandising manager spends his time in the one department, assisted by several helpers, including salespeople, stock-men, repair-men and delivery-men, depending upon the volume of business. Have the sale of the merchandise entirely separate from the sale of current, and give your merchandising men free play within the general policies set by the company. A person to handle this work successfully should be qualified by experience in selling household commodities to women, a general knowledge of store methods and an elementary understanding of electricity. The assistant buyer in the house-furnishing department of a department store is apt to have the proper qualifications, obtainable at a fair salary.

Class C Many of the big companies in which one man who is held responsible has several assistant managers for branch stores or different departments of the work have already established definite policies. The work can be handled as outlined under Class B, except that the volume being larger there will be more details and additional departments. All individuals working in this department should look to the appliance manager as their superior, and report directly to him. Keep the lines of authority well defined. The manager should know at all times the profit or loss made by his department.

Segregation of Statistical Information Keep all records of this work separate from other branches of the business. The results of each clerk's work should be easily obtainable. This is particularly valuable for use during campaigns. The average merchant charges expenses as shown on page 125 under Accounting Methods.

Companies must expect to lose money at first, but by keeping careful records leaks can be stopped. Improvements will be made from a knowledge of the mistakes.

The general manager should receive specific data with comparative figures as a check upon the merchandising man. In figuring profits do not consider revenue derived from current consumed. Sell your appliances as a separate commodity. Hold one man responsible for results, and give him records whereby his success or failure can be definitely measured and his tendencies noted.

DETAILED HANDLING OF RETAIL SALES

Inside Sales People—Their Training and Point of View

For handling retail salesmen consider this policy:

First—Base salary on the gross volume of merchandise sold. This is easily done when the salesman spends his entire time on the floor selling. If only part of the time is spent this way, judge of his selling ability by his effective sales hours.

Second—Have advancements made on a basis of gross business plus ability to co-operate with associates.

Third—Create a feeling that this work needs the best that each individual can give; that there is advancement ahead.

Fourth—Employ only people who will make good; do not use this department as a dumping ground for the inefficient. The employee should show the same ability here as elsewhere.

Fifth—The manager should put enthusiasm into this work. Do not consider it a side issue. It can be used as one of the biggest helps in getting good-will.

The United Cigar Stores Companies have 1000 retail stores. They have won out in a competitive field. The key to their success has been the efficiency of their sales people. This work is under the direct supervision of the vice-president, all of his time being devoted to it. The motto of the Companies might well be: "Salary based on sales made; to the customer, always courtesy and service." The watch-word is: "The customer is the boss. He pays your salary. We want his repeat orders."

Display of Merchandise in the Sales-Rooms and General Effect Created The general impression should be pleasing. Make the customer feel at ease. Give the impression of a pleasing anxiety to sell goods. A successful general effect is based on an analysis of the likes and dislikes of your average prospective customer. Understand her financial problems. Offer goods within her reach. You can afford to copy the methods pursued by the successful local merchants.

Size of Store For the ordinary company the store is that part of the office which is set aside for the sale and display of electrical merchandise. In estimating for size the stock and its attractive display, the customers and the clerks must be considered. The electrical store should be large enough to hold comfortably the average number of customers. A store of the proper size makes it easier for the customer to buy; easier for the clerks to sell, thereby reducing the size of the selling force; allows closer contact of the salespeople, making for enthusiasm and increased efficiency; gives the place a more business-like appearance and reduces miscellaneous sales and handling expenses. Check your present department and see if the space used is not too large and could not be given up in part for other purposes, thereby increasing the efficiency of the entire organization.

Companies planning to open a department should study carefully this phase of the work, estimating their anticipated volume of business and the average number of customers that may be expected to enter the store at one time.

INVENTORY AND PHYSICAL HANDLING OF STOCK

Inventories Inventories are necessary, as they show the value of the stock, the rapidity with which it moves and its physical condition, and check up on unsalable items.

Physical Handling of Stock Use a bin system with a bin for each article. The name of the article and the manufacturer's number, with the maximum and minimum stock limits should be placed on 4 by 5 inch cards fastened to the top of the bin in small tin holders. Bin data should agree with the card records kept in the perpetual inventory system.

Keep the merchandise clean. Expensive pieces, such as chafing dishes and percolators should be re-buffed by manufacturers whenever tarnished. The large companies could afford a small buffing wheel. Do not have stock so low that you cannot give satisfactory service to customers. One company uses Canton flannel bags for holding portables and highly polished items when in the stock room.

Have a systematic, orderly, intelligent stock-clerk. Have him keep the place in such condition that you will not be ashamed to take your most particular customer through it. Proper care will keep goods from deteriorating. Insist that the stock-clerk follow the old rule of "A place for everything, and everything in its place."

(See Addenda for complete stock handling system as used by one company)

ACCOUNTING METHODS

There is no one best method of handling accounting work. The Accounting Department should always keep the appliance manager informed of the exact condition of his department, and should properly apportion expenses and revenue. Accounts should be classified into some system.

(a) Buying—Salaries and wages, Other buying expenses
(b) Selling—Salary and wages, Commissions—Advertising through Newspapers, Circulars, Displays, &c.
(c) Delivery—Salaries and wages, Other delivery expenses
(d) Management expenses and fixed charges—Rent, Heat, Light, Power, Repairs and renewals of equipment, Depreciation of equipment, Insurance and stock equipment, Management and office salaries, Office supplies and expenses, Miscellaneous management expenses
(e) Losses from bad debts
(f) Interest on money invested

Following are the rules laid down by the National Association of Credit Men for figuring the cost of doing business, the percentage to be based on the selling price of the goods:

EXPENSES

Interest on investment
Rent
Salaries
Depreciation on goods damaged or changed in style sales value of which has fallen
Depreciation on buildings, tools and fixtures
Fixed charges; taxes, insurance, water, light, fuel
Donations or subscriptions paid
Incidental expenses; advertising, canvassing, telephone, telegrams
Losses, goods stolen, bad debts, allowances to customers
Collection expenses
Other expenses

The total of the eleven items equals the expenses for the year. To get the cost of doing business, divide expenses by total sales for the year. The result equals the cost of doing business, based on the selling prices of the goods.

The net profit or loss on an article can be found by deducting the percentage it costs to do business from the sales price. From the remainder, deduct the cost of the article, including freightage and drayage (laid-down cost) and the balance will equal the net profit or loss.

The Committee suggests using the standard retail method for figuring inventory. "Cost of goods, not including cash discount, plus freight, plus drayage, equals laid-down cost or inventory cost."

The following are the two standard methods used by retail stores for estimating the yearly turn-over of stock: (1) Gross sales of the year divided by the average stock on hand figured at sales cost, equals the turn-over, and (2) The net cost of stock sold during the year divided by the net cost of the average stock on hand, equals the turn-over. Your stock should be turned over from three to five times a year.

USE OF REGULAR LIGHTING COMPANY SALESMEN FOR SELLING APPLIANCES

The lighting company salesmen are in constant contact with the public, and have entrée into many homes, can act as "fix-it men" and hence should sell appliances.

Ordinary merchants do not have this machinery for making sales. Pay your salesmen a commission on the sales made, with a smaller commission on leads turned in which result in sales. In no case figure the commissions on the amount of current consumed. Educate the men to talk and sell appliances that have the greatest utilitarian value from the consumer's point of view.

In many cases, salesmen can use appliances as a talking point toward having houses wired.

REPAIRS AND GENERAL SERVICE

Many of the best American merchants have adopted the policy of "money back if not satisfied." The appliance department should give service for service's sake. If possible, forget the value of appliances as consumers of current when handling the public. This attitude will help to overcome the latent feeling that the electrical store has an ulterior motive for selling goods, over and above the profits made on the sale. There are still some people who feel that an adjustment is made to the meter when a device is placed in use. Once a bank clerk bought an appliance from the lighting company and later, returning it for credit, bought the same device from the manufacturer.

He was very well satisfied with it but did not want the lighting company to know he was using an appliance as something special would be done to the meter.

The central station should guarantee all electrical parts for one year. The lighting company should keep a stock of elements on hand, making no charge for the local repairs but returning the defective elements to the manufacturer for credit. In repairing parts such as cords, not covered by guarantee, make the necessary adjustments and charge the customer for time and material, preferably at predetermined prices. Should the customer complain, state the company's side of the story and appeal to the user's spirit of fairness. In nine cases out of ten the customer will agree to the charge and have more respect for the company.

Have a bin for each day of the week, one marked "Rush for to-day," another "Awaiting parts from manufacturers," and another "Held for future information." Put items for repair in the proper bin; you can then tell automatically whether repairs are being properly handled. A record of repairs made will be an aid in deciding what line to purchase.

Separate the repair from the stock department. For this work get a bright young man. Make him appreciate the necessity of giving customers good service, as there is a big opportunity here for making friends for the appliance department.

INSTALLMENT PLAN OF SELLING AND COLLECTING

The lighting company has an advantage over the ordinary merchant in that it knows its customers and is in a position to estimate credit risks. The monthly bills make an ideal collection system, calling for a minimum amount of additional bookkeeping.

By the installment plan, the middle and poorer classes can purchase devices, where the capital investment would be too large if the entire purchase price was required in one payment. The installment plan is particularly valuable for Christmas purchases as the electrical store can be made a shopping center for the entire family, the payments being spread over several months.

One company co-operates with the contractors on the installment plan, by assuming collection responsibilities on devices sold by the latter.

AVOIDING LEAKS AND LOSSES

Fire—Proper precautions should be taken and necessary insurance carried.

Help—In employing help, set your standard high. Pay just salaries and expect the best returns; under no circumstances take people with doubtful reputations; have employees bonded.

Care of Merchandise—A reliable and efficient organization will keep at a minimum losses from careless handling, breakage and poor packing.

Waste—Watch the use of supplies, wrapping paper, twine, stationery.

Unsalable Stock—Hold the manager or the buyer responsible for these losses. A bargain counter will keep this loss down.

Waste of Light—Watch this in the stock and repair departments.

Delivery Department—With proper study of deliveries the work can be scheduled and little opportunity given for losses such as goods lost in transit and damaged in wagons; time lost in routing deliveries and used improperly; lost containers, boxes and crates. In some companies the delivery man is held responsible.

Salesmen's Errors—Incorrect change, wrong addresses, wrong discounts may be avoided by training salesmen.

Waste of Time and Labor—Careful supervision of salesmen and helpers by reliable employees will correct this.

Sales That do not Stick—As a rule such goods are not sold properly. The salesmen do not consider customer's best interest, do not find out whether the device in question is the best for the case.

Customers Who do not Come Back—Successful merchandising is based on repeat orders. If your customers do not come back analyze carefully your policies, your methods and your goods.

Ignorance of Stock—There is no excuse for this. It is intolerable.

Selling Appliances for the Wrong Voltage—This causes repetition of handling and annoys the customer. Provide salesmen with schedules.

CAMPAIGNS

Necessity of Campaigns Human nature demands variety and change. It is only the new, the different, or the unusual that attracts attention and excites interest. Nature's law of habit makes the ordinary the every-day occurrence pass unnoticed. Consider this in making your sales plans. Change your method of attack. As proof of this, note the successful department store, with its continuous array of special inducements, reduced prices, special service and other attention-getting methods. In every store some sort of a change must be made.

Arrangement of Campaign The central station's problem is different from that of the ordinary store. It must keep the good-will of the local merchants and co-operate with them. They are factors in creating a demand which the lighting company must not ignore. Electrical merchandise is adapted to seasonable selling. The work commences in early spring. One manufacturing firm runs a special cut-price campaign at that time to stimulate dormant business and create a seasonal interest in all electrical appliances.

The spring and summer season, from April to August offers an ideal time for flat-irons, grills, percolators, toasters, and other household labor-saving devices, such as vacuum cleaners and washing machines, the special talking points being their comfort and their convenience. Electric fans would naturally come in at this season.

The fall, September and October, offers an opportunity for pushing electric radiators, portable lamps, percolators, toasters, and vacuum cleaners. Beginning the first of September, there are many cold days and evenings, when a small-sized electric radiator is a household necessity.

January, February and March are a special season for selling heating-pads. From the user's point of view, there is no device which gives as much satisfaction as a heating-pad. By working with the doctors, hospitals and nurses, an opportunity is offered for doing a nice business in an off-season.

Particular emphasis should be put on the value of electrical merchandise as Christmas gifts. The "shop early" idea can be featured. The success of this campaign depends on the length of time it is run. Sell appliances as gifts in November and in December. Friends will tell each other what they are giving as presents, which helps to make repeat orders.

Some concerns maintain a perpetual bargain counter on which shop-worn articles are offered at special prices. This appeals to the shopping instinct and reaches a class of people that could be reached by no other method.

Length of Campaign This depends on the merchandise sold, the community, and the enthusiasm of the sales organization. No campaign should be carried on after the attention and interest of the customer has ceased. By changing the method of attack it is often possible to re-stimulate the enthusiasm of the trade, and increase the length of the special sale.

Dual Effect Remember, any campaign works two ways It excites the interest and enthusiasm of both buying public and sales organization. No individual can keep at concert pitch

365 days in the year. If a worker's efficiency could be charted, it would show plateau periods, followed by periods of rapid advancement. A campaign offers a legitimate means for stimulating individuals to increased activity. Not unless the sales manager has had actual experience with this psychological stimulant, will he appreciate the necessity for campaign methods. Take the case of the Sherwin-Williams Paint Company. By a special booster campaign in an off year with the organization already up to standard it was possible to exceed all former records, both in sales of the individuals and in the organization as a whole. The secret was enthusiasm, the spirit of the game, which was engendered throughout the entire company. It has been said that business is the medium which absorbs the fighting instinct of the average individual. If such is the case, it is by campaign methods that the lust of combat is brought to white heat.

Co-operation of Retail Stores Local merchants active in selling appliances should be protected during the campaign period, say by consigning a limited amount of merchandise to them with the understanding that they will display the goods in their show-windows and will follow the general plan of procedure mapped out by the lighting company, receiving a fair commission on any orders they may turn in. In this case, the dealers act as brokers and as branch show-rooms for the central stations. During a campaign get as many points of contact with the trade as is possible. The accumulated effect of many displays will be another factor in creating a demand and making the sale a success.

Estimating Cost of Campaign On the supposition that the appliance department is run on a straight profit or loss basis, the average central station should expect to lose on most of its campaigns. A careful survey of the expenditures and a definite appropriation should be allowed before starting a special sale, this appropriation not to be exceeded. From an accounting standpoint, treat each campaign as a separate thing, and include in it all expenditures and revenue received to show the exact profit or loss. As a rule, it will be found that a campaign will greatly stimulate the business done in other merchandise. The total volume of sales on the regular lines should increase 10 per cent with well established companies or a higher figure for new companies that are doing a smaller volume of business. After the campaign is finished do not discontinue the sale of the appliance in question. Such things as flat-irons should be sold the year round. Let the public know in advance when the cut in price will be made and under no consideration make concessions after the special period is past.

BUYING

The buyer is an interpreter. It is his task to supply the existing demands of his customers, and to satisfy latent desires which become active by educating his prospects. Electrical appliances would not be in such general use if buyers had not divined what could be used, or if the sales department had not created a demand.

Base your judgment upon your analysis of the market, considering particularly financial conditions, the general attitude taken by your customers toward labor-saving devices, and the appliances already in use, remembering their repeat-order value.

The majority of your customers are women. Consider whether the goods will be appropriate for use in their homes. The average customer reasons from the known to the unknown, hence, buy household specialties which are simple and like the things the women already use.

In figuring profits to be made, consider the rapidity of turnover and the discount. If one manufacturer offers 33 1/3 per cent and his goods move three times a year, the proposition is better than a 40 per cent discount where goods will only turn over twice.

The appliance manager should be responsible for the purchasing of all electrical merchandise. Unsalable pieces should be looked upon as errors in judgment on the buyer's part.

The buyer must interpret quality in terms of what the majority of his customers can afford to pay. The design and general type of the device must be based on the likes and dislikes of the general public, but in all cases purchase reliable appliances.

ADVERTISING

Can you think of buying a fountain pen without thinking of Waterman's; of buying a watch without thinking of an Elgin, Waltham or Ingersoll watch? Probably not. Advertising did it.

Every one is susceptible to the power of suggestion. As a general rule women are more susceptible to suggestion than men. An advertisement is a suggestion to buy a certain article. Seen often enough, we sooner or later read the advertisement, until, unconsciously, the advantages of the article advertised become a part of our knowledge or consciousness and finally we buy the article. Daily use of an article soon becomes a habit and finally the article seem's to be a necessity. This principle of suggestion and habit is accountable for the luxuries of yesterday becoming the necessities of to-day.

Need of Educational Advertising Most housekeepers do not yet understand the uses or advantages of electrical appliances, believing that they are in the luxury stage. To bring about a popular demand for electrical appliances, there is need of much co-operative, educational advertising and publicity, in addition to the present wide publicity through the large number of magazine articles. This form of publicity is doing good work, but it is indirect. What is neded also is educational work of a direct and positive nature.

Co-operative Work by Manufacturers and Central-Stations The leading manufacturers of electrical appliances are now conducting national advertising campaigns, furnishing newspaper electrotypes, show-cards and folders, but much of this advertising material is so designed that it entirely disregards the central station or local dealer, and rather indicates that the reader is supposed to write to the manufacturer for the goods.

Again, the electrotypes of some manufacturers are not set up on the same plan as the circulars furnished to central stations, yet all three are directly connected. A central-station manager cannot effectively capitalize the magazine advertising and create a maximum local demand for the goods advertised.

On the other hand, many of the central stations do not use the manufacturers' advertising literature in a way to secure maximum results in accordance with a well worked out plan. Much of it is actually wasted. The magazine advertising and local advertising do not combine in a strong local appeal. Through the lack of close co-operation, there is a break in the continuity of the suggestion received from magazine advertising and a consequent loss of appeal. The public does not receive local endorsement of the magazine advertisement, nor concrete information as to where the goods may be examined and purchased.

Your committee suggests the following plan: Central-station managers and manufacturers should agree upon the most seasonable time for the sale of the different appliances, then all unite in campaigns to sell these appliances at the time agreed upon. The national and local advertising follow and dovetail with the sales effort.

The month of January may be devoted to special sales of odd lots or shopworn appliances. During February all appliance representatives might canvass from house to house for heating-pads.

From March to September, inclusive, excepting June, house to house canvasses should be made for flat-iron sales, covering every flat-iron prospect during the period. Before and after these months the sale of irons is not sufficient to pay the cost of selling.

During March to June and September to December, campaigns may be conducted on vacuum cleaners. Many vacuum cleaners are given as Christmas presents. During June hold a campaign on a group of cooking appliances. In October have a combined sale of any two appliances the customer may desire, excepting the flat-iron. In November and December conduct regular Christmas sales, emphasizing one or two appliances as leaders.

Your Committee also suggests that in magazine advertisements the manufacturers refer the reader to "your electric light company or all good dealers in electrical appliances"; that show-window cards and set displays be of a high quality and designed to create a demand for the dealer; that, for the purpose of concentrating attention, one article only be described in a folder intended for use in a campaign and that the folder be written from the central-station or dealer's view-point; that manufacturers notify the central-station manager of proposed national campaigns and co-operate with the central-station manager in building a concurrent local campaign. Every central-station manager should co-operate.

The Value of Advertising to Central Stations One central station sold 300 irons at the regular price through the medium of 500 letters sent to customers who did not use their minimum charge of $1. Many other cases might be mentioned to prove to central-station managers the value of good advertising and of close co-operation in creating a local demand for nationally advertised goods.

Comparison of Methods of Advertising The most effective and most economical form of advertising, especially for the central station, is direct by mail. Then the sheets reach without waste the people who are using electric current and know its conveniences. The value of any form of advertising depends upon the time and attention that it secures. A carefully conducted test made in a large city in the Middle West proved that the average person spends only about fifteen minutes in reading the daily papers and only 10 per cent of this time is spent in reading advertisements. In large Eastern cities newspaper advertisements have an attention-factor of about one-and-one-half minutes; they are second in advertising value, because electric service constitute only a small percentage of the total circulation. This statement does not apply to small Eastern cities and towns, where the rates on either daily or weekly papers are comparatively low and waste circulation is not an extravagance. The dailies are usually evening papers and both the daily and weekly papers are carefully read by the women folk at least. For these reasons, newspapers in small Eastern towns are good advertising mediums. The same is true of newspapers in Western cities and on the Pacific Coast, and where a large percentage of the population uses electricity.

The average passenger on a trolley car rides from ten to fifteen minutes, in which most passengers, especially women, must either look at the floor of the car, at the other passengers, or at the advertising cards. The floor is not attractive, it is bad taste to stare, so, unconsciously the passengers spend the time in reading the trolley car cards. Because of these conditions, trolley car cards receive attention for a longer period than newspaper or magazine advertisements. It is time-and-attention-factor that gives car cards their advertising value and explains why they are used to such an extent.

The value of billboard advertising depends entirely upon the number of people who see it, how often they see it and the time given to reading it. Although several of the larger companies use billboards, it is the opinion of your Committee that billboard advertising ranks fourth in sales value.

It is generally conceded that stickers are the best form of advertising to be mailed with bills.

The Advertising Plan The advertising plan should be made to fit the selling plan, and completely outlined at the beginning of the year for the entire twelve months, at which time the expenditure for advertising should be determined.

Some one person should be responsible for all advertising. Even in small companies this person should be an experienced advertising man, or one connected with the sales department who has some aptitude for the work. This person should remember that advertising is salesmanship on paper. Therefore, the advertisement should not be dashed off quickly and consist of a lot of generalities. Even if it is to be followed by salesmen, it should be written to complete the sale.

This person should consider the following:

What plan will be used in selling the article?
Is the advertising to complete the sale?
Is the advertising to be followed by salesmen?
Is it to be used with manufacturer's magazine advertising?
Is it to conform with window displays and show-cards?
What class of women represents the average customer?
What are the tastes and customs of this class of women?
What are the reasons why they have not bought?
What are their probable objections?
What is the best means to overcome these objections?
What are the exclusive selling points of the article?
Is the advertisement to be a post-card, folder or booklet?
Will it be improved or strengthened, if illustrated?
If so, with what illustration? Line cut? Half-tone?

The advertising should be constructed along the following lines: Select the selling point that is most likely to arrest and hold the attention of the particular class of customer on the subject of the advertisement. Put this in the heading. Then play up the selling points of the article, giving the most interesting one first and the most convincing one last, all expressed in a straightforward, convincing manner. When this is done, make it easy for the customer to act, by attaching or enclosing an addressed post-card, and giving a reason, if possible, why the customer should mail the card at once.

These methods are applicable to small companies. If the company is a very small one and has no one in it who can prepare its advertising matter, most of the manufacturers will furnish complete advertising material for their goods and also the co-operation of their advertising department in directing the use of it.

Card File and Mailing List Every central station should have a complete card-file and mailing list of its customers, showing names and addresses and a list of all appliances owned by each. These cards filed by streets act as a basis for all sales efforts. Every central station of any considerable size will find it profitable to establish a circularization department. All prospect lists should be duplicated in the name-plates used in connection with the addressing system and kept in the addressing department. The lists should be classified as "Advertising List—Power," "Advertising List—Light," "Advertising List—Signs," "Advertising List—Irons," "Advertising List—Appliances Other Than Irons." The last two mentioned include all residence customers and constitute the entire appliance prospect list, the names of customers who have not irons being separated and constituting the prospect list for irons. The list mentioned last will of course include those who have and those who have not an electric iron. The lists should be kept up to date by correcting the names each month in accordance with all transfers and cut outs.

When advertising literature is to be sent out, envelopes are sent to the addressing department with instructions to address them according to a specified list and return to the advertising clerk who will fill them. They are then so mailed that they will precede the call of the representative by only one or two days. Advertising matter should be used only in conjunction with the work of the new business representatives and should be followed by a call from the representative covering the district selected, except when the literature is written and designed to complete the sale.

The Cumulative Value of Advertising A central-station manager should not become discouraged because his first advertising efforts do not bring the desired results. The effect of advertising is cumulative. Let him consider how many times he has glanced at an advertisement, reading just the heading;

how many times he read the advertisement before he decided to buy the article advertised; how many times he forgot it before he finally bought it. In the meantime the advertisement was probably still running at the same cost to the advertiser, but others were being influenced subconsciously just as he was. Other satisfied buyers were telling their friends of the article just as he was. In some such way, through the power of suggestion, constant advertising educates the public to believe that they need electrical appliances, and sooner or later they will buy and use them and come to know that electrical appliances are necessities.

SHOW-WINDOW AND INTERIOR DISPLAYS

There are few set rules to guide the display man in his work, but there are principles that should be observed if the best results are to be obtained. Aside from an artistic eye and deft workmanship, the only other requisite of a successful display man is common sense.

The window display that is made on artistic lines will attract favorable attention because the knowledge of the masses as to the fitness of things is much greater than is generally supposed. All people may not be critics but they are unconsciously attracted to an artistic display. It is fortunate that there is harmony between the artistic and the practical. The public is pleased and merchant is benefited by the practical artistically displayed.

The general public is composed entirely of possible customers, but only the pleased element can be considered as probable purchasers. If the public receives favorable impressions from the show-windows they have been brought to a condition of mind which must always precede purchase. The display has secured their "good will" as well as their attention. The public expects modern service from central stations as well as from other merchants and one essential of this service is a modern store front and window display. The same methods apply in the sale of electric service or drygoods. The appearance of the store front goes a long way in determining the standing of the business in people's estimation.

People prefer to trade in an attractive shop. It is natural to patronize the store with a good front, so the central station's store-front publicity should be kept up to the standard set by the best stores in other lines. Frequently the big rental paid for a location where the greatest number of people pass, for displaying merchandise in show-windows or store interiors in an attractive manner, undoubtedly results in many sales both directly and indirectly. The indirect result is slower but a favorable impression may be made that some time later will result in sales. If the store front is not selling merchandise the location is not serving every purpose it should. Every inch of street frontage is valuable, more valuable than any other space in a store.

Displays The show-window is one of the strong connecting links between the business and the public. None of the aids in building up retail business should be given greater credit for direct results than a display behind the glass.

The purpose of the show-window being to sell goods, a display should always carry a selling "punch" which should ***never*** be sacrificed.

A frequent mistake made by the inexperienced is to make the display "flat." The merchandise at the back and on either side should be elevated on pedestals to give height to these parts. The heaviest part of the display should be in the center. Unless goods are very small, when merchandise is placed too near the glass the effect is not good.

Store-Front Publicity Store-front publicity takes in not only the shop itself, but every exterior feature that draws attention to the front or even the building itself. An electric sign should be a feature in store-front publicity. Light has converted many a street from obscurity and brought many a store into prominence. The example set by the central station is likely to be followed by merchants. The central station shop-window should be the best lighted on the thoroughfare to make it a standing advertisement of the value of good lighting.

Store-Front Construction The show-window comprises (1) the exterior parts including base, glass, frame-work, top and store-door and (2) the interior parts, ceiling, floor, background and the lighting system. All of these should be carefully constructed if displays are to be effective. The general practice is to have the base 18 inches high for best dressing. The store door should be impressive in pattern and should have a large plate-glass panel and a 10 or 12-inch brass "kick-plate."

For the entrance or vestibule, a floor of colored rubber or other tiling with the name inlaid adds greatly to the appearance. The best quality of plate glass should be used for the window and should be kept immaculately clean both inside and out. The frame-work of the window should be neat and strong, preferably of metal, which is practically indestructible. Because of the possibility of breaking or cracking, "butt-end" glass construction is losing favor, a metal corner bar being preferred.

Window — Ceiling Where the store ceiling is high it is difficult to make an attractive window display without using a false ceiling as there is practically nothing to fill the upper part of the window and the result is a barren appearance. Such a ceiling is usually placed at a height of about nine feet from the floor of the window and should be of wood panelled or beamed. Such a ceiling limits the range of vision to the display space.

Window — Background The window itself should be divided from the rest of the shop by a partition or background of such height that the interior of the store is not visible, as otherwise the interior diverts the attention of the observer.

The background serves to make the display stand out, and gives an opportunity for proper illumination because the full effect of the light can be concentrated on the goods shown. It need not be of mahogany or other expensive wood; composition board will do very well. This is a wood-veneer of mahogany, oak or other hard wood, and a backing of roofing paper or wood pulp. This board comes in pieces eight feet or more long and four feet wide, is light in weight and takes paint readily.

A plush or other hanging can be used instead of a permanent background, but is likely to be dust-laden most of the time.

The background should not be too dark as this causes reflection of the street on sunny days from the glass, making it impossible to see the display. Five to six feet from glass to background is a good depth.

Window Floor The appearance of the floor of the window will do much to enhance or detract from the appearance of the merchandise shown. A hardwood floor of oak with a parquetry border is the best for all purposes, is easy to keep clean, and with care will look well for years. Frequently a dark green carpet is used with a parquetry border. Linoleum may be had in parquetry patterns and when shellaced and varnished serves very well.

In the rear of every window electric base receptacles should be inserted in the plateau to provide connections for appliances. In the ceiling permanent outlets should be provided for lighting fixtures.

Window Illumination The value of a show-window is increased greatly at night in two important particulars, viz.: The mind of the observer is freer at night than during the hustle and bustle of the business day and hence more sensitive to impressions, and the drawing power of the window is greater because of the contrast between the window and its environments. It is therefore of first importance to properly illuminate the display. Lamps should be so placed that the light cannot enter the eye directly from the luminous center since the pupil of the eye adjusts itself to the brightest spot in the range of vision. If the pupil is contracted by direct rays from the lamps the goods are necessarily less visible.

The reflection of light units from the back of a window detracts from the value of the display. For this reason a matte finish should be installed, or, if the upper section is of glass to permit the passage of daylight, a curtain should be arranged to cover the glass when light units are used.

Many of the best stores have fine window-illumination marred by a distinct line of reflected light on the background.

Conclusions (1)All light sources should be concealed, (2) as near the front of the window as possible, (3) high enough to be out of the range of vision, and (4) equipped with deep opaque reflectors, completely covering them. (5) The wattage should vary from 15 to 25 watts per sq-ft, dependent upon the location of the store (on or off a main thoroughfare) and also upon the color of the display. (6) Units should be controlled by not less than two switches, so that different intensities can be secured, and by a time-switch.

Fixtures The display man can do very little without proper window equipment and accessories, fixtures and decorative material to draw from. Metal and wooden fixtures suitable for every display need can be purchased at a very reasonable cost. Probably the most necessary are pedestals, used to support shelves for electrical appliances. By using such pedestals a display can be built high in some parts and low in others and thus do away with the flat, uninviting look that is very often noticeable. Pedestals are made from hard wood, finished to match any desired color, generally in either mahogany or oak. The pedestals should be 12, 18, 24, 30 or 36 inches high.

It is a good plan to have a set of circular shelves ranging from 18 inches to 36 inches in diameter, as well as oval, square and oblong shelves of heavy plate glass or cut from composition board, painted or covered with crepe paper, sateen, denim or burlap. Glass pedestals are very attractive and may be had 12, 15 and 18 inches high, or ordinary glass candlesticks such as can be bought at "5 and 10 Cent Stores" may be used. Portable

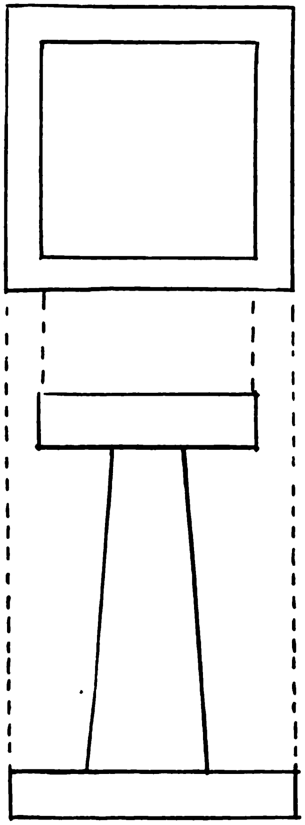


FIG 1—PEDESTAL

Top 7½ in sq; base 10 in sq; post 6 in at base, 3½ in at top; edging 3 in wide; top and base screwed and glued to upright platforms that fit together to make different sizes will be of service in displaying large devices such as washing machines, ranges, etc. A shadow-box is very useful for the display of some leader or special article.

Metal card-holders in ¼ sheet (11 in by 14 in) and ⅛ sheet (7 in by 11 in) sizes will serve to hold the show-card.

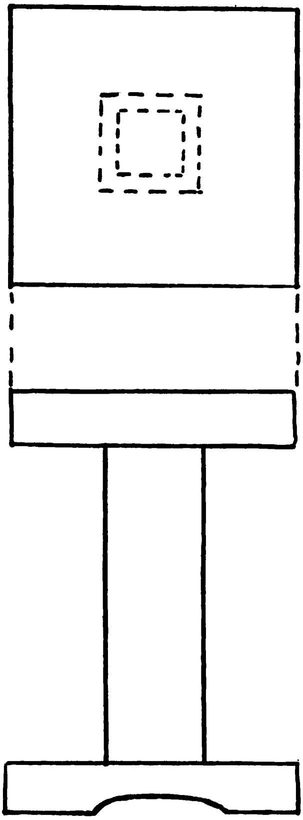


FIG 2—PEDESTAL

Top and base 10 in sq; post on upright 4 in sq; edging around top and base 3 in wide; top and base screwed and glued to upright

Velour or plush adds a "rich" appearance to the display when draped over the floor and around the pedestals. Other materials are silkaline and sateen, but these fade very quickly while the velour or plush is fast color.

Artificial flowers and foliage are not expensive and add much to the appearance. The average man or woman is susceptible to beauty and the display that is made attractive with touches of color makes a stronger appeal.

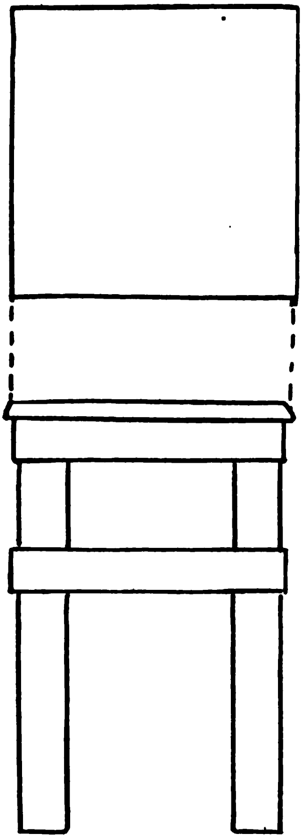


FIG 3—PEDESTAL

Top 12 in sq; 1 in thick; legs of half inch stock; 2 in wide; edging same size as legs

A small room should be provided for the storing of the window properties when they are not in use. This will save much time and will keep the materials in much better condition than is possible when no special place is provided.

Cost of Display While all expenses should be kept down to a reasonable basis it is inadvisable to allow too small a sum as the windows are likely to lose in selling value far more than the dealer will gain by his saving. An extra dollar or two spent on a display may often be the means of turning a mediocre display into an attractive sales producer.

The display should be in charge of some one who has an aptitude for that kind of work, who is allowed to work out his ideas and given time to put in the displays during the day.

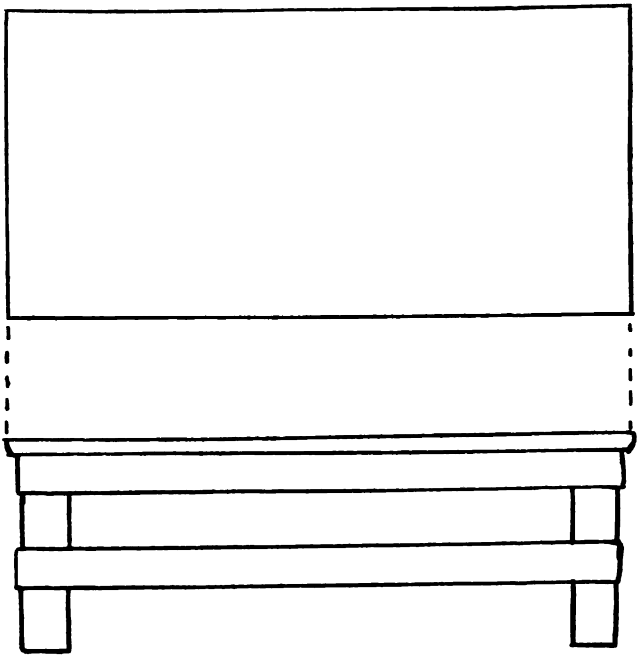


FIG 4—PLATEAU

Top 30 in by 15 in thick; legs of half inch stock; two in wide; edging same size as legs 12 inches high.

Change of Display In most cities a display does more selling in one hour at night than in three or four in the daytime, hence the display should be changed during the hours in which it is least effective, usually the morning. A regular time should be set aside each week, a schedule of changes planned ahead and this arrangement adhered to. No display should be left in a window more than one week, as most of the people have passed in this time and the display loses much pulling power.

"Unit" and "Full" Displays The manner of displaying merchandise generally followed is to make either "unit" or "full" displays. A unit display can be one group or several groups of merchandise. The unit method of handling merchandise depends for its effectiveness on the handling of each piece or group. Full displays are those in which all available space is taken up by the merchandise without reference to the relations of the different items to each other. The unit arrangement is the newer and better way and it is especially adapted to displaying electrical merchandise. Care must be used in making unit displays to have plenty of space between the units. A crowded window bewilders the beholder. Each unit should consist of related devices. By making units of this kind, a desire for the group is created instead of for one individual piece.

Figs 5 and 6 show "set ups" for a unit and a complete display.

Window trimming is salesmanship display; the selling points must be apparent to the public, just as the selling points are brought out in a talk. The same common sense that is applied to other forms of selling will aid in making displays that sell merchandise. Probably no line of merchandise offers greater opportunities for effective displays than electrical merchandise.

Moving Exhibits Electric light and motion displays and the general interest of the public in anything electrical give to electrical displays a tremendous advantage over other kinds. Many beautiful effects can be obtained by the use of colored miniature lamps or larger lamps when colored and attached to a flasher. Spot lights may be used to advantage occasionally when it is desired that certain objects on display be made prominent. Used in connection with a flasher to throw on and off the regular window lamps, parts of the display can be brightly illuminated while the remainder is in semi-darkness.

Mechanical displays are excellent attention arresters, as the eye is unconsciously attracted by life and motion. The small motor offers opportunity for creating many moving displays. An electrically operated turn-table on which electrical merchandise is attractively arranged, is a good feature to use occasionally. Several devices on the market automatically show a succession of display cards, used with catch advertising matter.

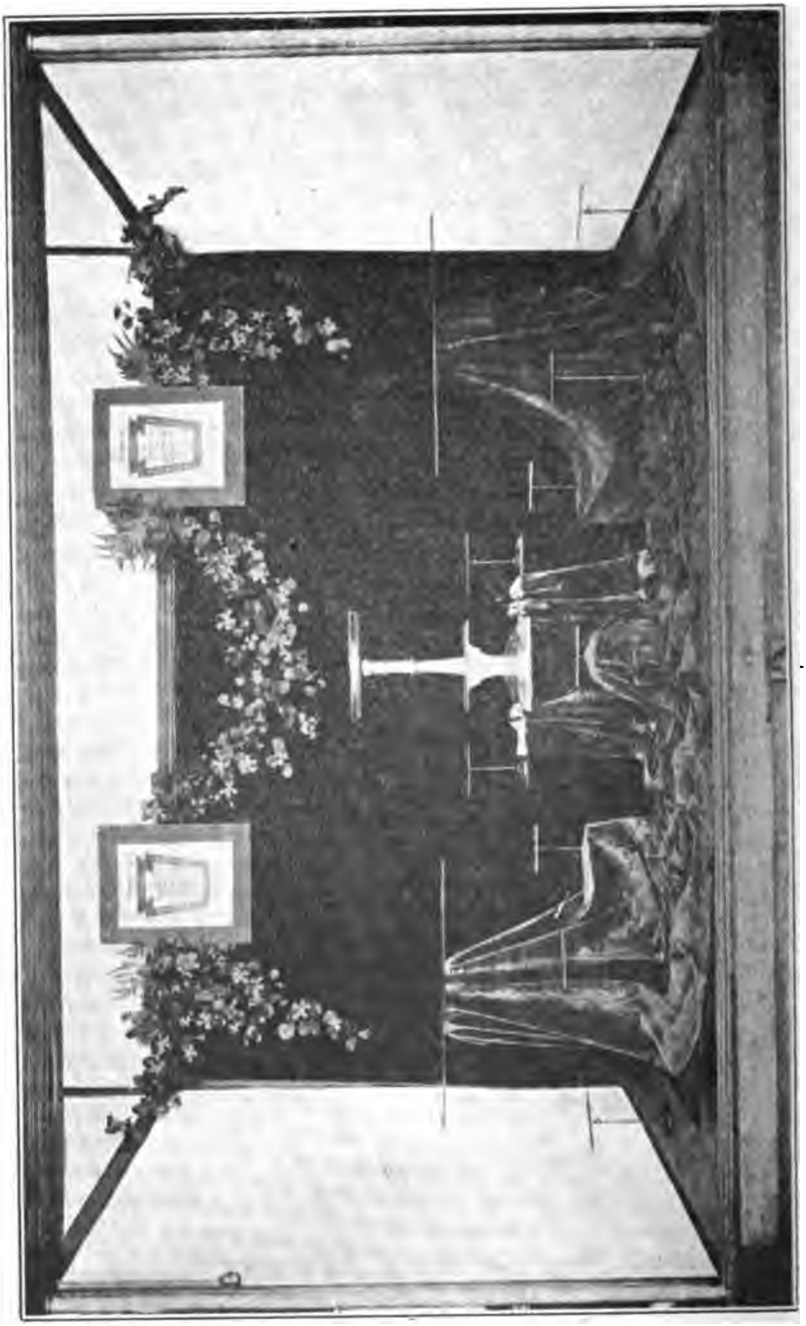


Fig 5—Example of "Set-up"

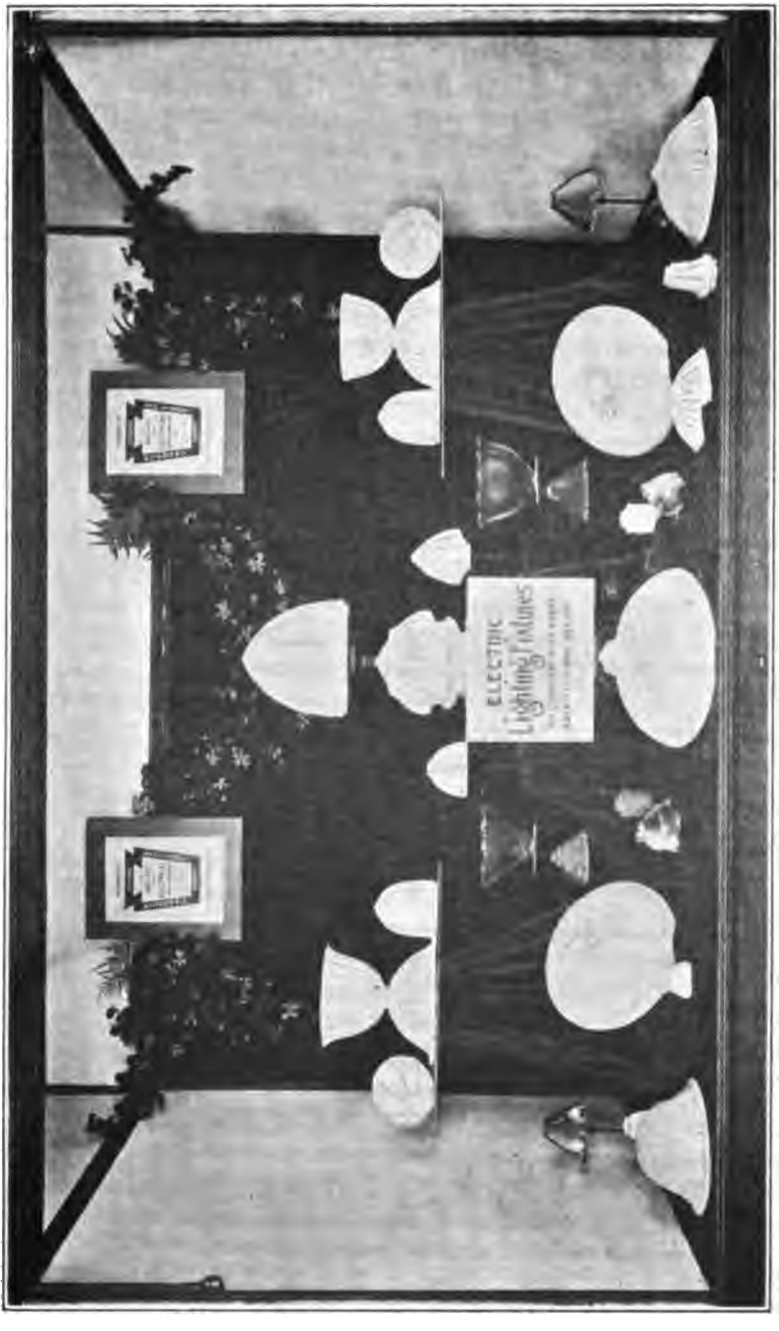


FIG 6—EXAMPLE OF "COMPLETE DISPLAY"

One large company has as a permanent feature of its displays an impersonator. For example, this man during Edison Week impersonated Thomas A. Edison very successfully. In connection with a display of electric fans last summer he impersonated an Arab in an Arabian desert and at another time an Eskimo in a North Pole window. In another very effective window he impersonated the Goddess of Liberty Enlightening the World, as a reproduction of the statue in the New York Harbor, in connection with the introduction of the 1000-watt nitrogen lamp. When making a sale of vibrators, which up to this period had not been satisfactory, he appeared as a trained nurse. The window was dressed to represent a doctor's office, showing sterilizers and other necessary paraphernalia. On a chair was a wax figure of a man. On this subject the trained nurse demonstrated the various uses of the vibrator. The first day this display was placed several vibrators were sold and seventy prospects obtained, and the sales of vibrators were stimulated for at least a month. These demonstrations have been carried on at irregular intervals so that the interest thus created may not die out. Good results have been obtained on each article demonstrated in the window from time to time.

Where it is impossible to have a live demonstrator, a wax figure can be used to advantage. These figures can be made to appear very life-like when posed with such devices as electric cleaners, etc. To produce sales results the mechanical feature must be of such character that it calls attention to the merchandise shown rather than to itself. Care must be taken that the demonstration be of such character that it does more than attract a curious crowd. It must be carried out in a way to drive home the value of the appliance shown.

Good distinct photographs of appliances in actual use, neatly framed or mounted and used in connection with the appliances displayed, aid greatly in creating a desire, particularly those showing devices in use in the home or office.

Many appliances are so constructed that they can readily be taken apart and the various parts shown. In planning window displays this feature should be used, as the sooner the public is enlightened as to the construction of appliances the quicker results will be derived from their sale and use.

Interior Displays Interior displays should further the buying desire created by the window. People frequently purchase not only the article for which they came in but many other things, if these be attractively displayed. It is well worth while to use much the same care on interior displays that is used on the show-window. Every inch of space that is used for display purposes should have the devices grouped in an attractive manner. Sight is a most potent sense to appeal to in selling, and every minute a customer is inside the store should create a desire for something displayed. Wall and floor cases, counters and tables, all are of great service. Wherever cases are used, proper lighting should be a part of their equipment. It is an excellent plan also to mark goods in plain figures.

Dealer Helps Many excellent suggestions and much good display matter are furnished free of charge by manufacturers. Much of this material has been wasted through lack of interest, but a careful survey of it will convince the electrical dealer that most of it can be used to excellent advantage.

Decorative features Decorative features should be used occasionally to give a different appearance to the background.

Merchandise itself can be made to look somewhat different by changes in arrangement, but in order to attract the attention of the passer-by, there should be some unusual feature, either of color, treatment, background arrangement or setting. The electrical dealer must rely to a considerable extent on back color or arrangement to draw attention to his displays.

CALENDAR OF APPROPRIATE SEASONABLE DISPLAYS

January In northern latitudes January is a month of snow, ice and low temperature, therefore, snowy landscapes, white leaves, etc., should be used. The seasonable colors are white, red, black, blue and shades of green.

"New Year" gives an opportunity to make a display featuring "resolutions," "turning over a new leaf," etc.

February February is a similar month, and the holidays, Lincoln's Birthday, Washington's Birthday, and Saint Valentine's day give unusual opportunities. Red, white and blue should be used for the patriotic days, and red, silver and gold are the best colors for Saint Valentine's Day.

March The month of snow, sleet, severe wind storms and heavy rains. It is the between-season time and it is advisable to use some light colors suggestive of spring with displays. St. Patrick's Day green may be featured preceding March 17th.

April April is generally the month in which Easter falls. The Easter lily, rabbits and chicks are used. Violet, purple, white, cream and silver are seasonable colors.

May May is moving and house-cleaning month. Decoration Day falls on May 30th. For this the patriotic colors, red, white and blue, and gold and silver can be used.

June June is the bridal month and the month of roses. This also is the first month of the summer season. Light summery effects should be used.

July July brings the "Glorious Fourth," and the eagle, American flags, shields, fire crackers, etc., should be used. Red, white and blue, gold and silver are the colors. Later in the month "keep cool" suggestions are used.

August and September August and September displays should have vacation features bearing on this.

October In the late September and October, fall coloring and autumn leaves should be used. Brown, black, yellow, orange, red and green are autumn colors. Witches, black cats, bats, etc., are typical of Hallowe'en, October 31st.

November November is the Thanksgiving month and the turkey is the feature. Autumn colors are seasonable.

December Christmas gives many opportunities. Santa Claus heads, stars, bells, wreaths, poinsettias, laurel and mistletoe are all used at this time. Fireplaces, chimney, reindeer, snowy landscapes, icicles, etc., are seasonable symbols.

Color Harmony As the attractive appearance of a display will depend to some extent on the color, some knowledge of color harmony is essential in order that a display may have no jarring tones. People are attracted by color and it is well to make use of this fact and use color accessories, such as velour, artificial foliage, etc., to enhance the appearance of the devices themselves. Pure blue, pure red and pure yellow are the primary colors and are used as standards.

Color harmony is of two kinds "harmony of analogy" and "harmony of contrast." Harmony of analogy consists of the harmony of related colors or tones of one color. Harmony of contrast consists of colors in no way related. Yellow and blue when combined make green. Therefore, anything blue or yellow will be in harmony when displayed on green. Purple is formed by combining red and blue, so either of these colors will harmonize with a background of purple. White or black go well with any color but together form a very effective contrast. Never use more than three colors in one display. White placed next to a color heightens or intensifies the tone of that color, black weakens the color used next to it.

Red and yellow are warm colors and should be avoided in summer weather, while blue, green, lavender and white have a cool appearance, and can be used extensively.

Advancing or luminous colors are those which contain considerable red or yellow, receding or somber colors contain mostly blue.

Black should be used with luminous colors as:

Orange	black	red	Yellow	black	violet
yellow	black	orange	green	black	yellow
yellow	black	red	orange	black	green

White is preferable when associated with a luminous and a somber color as:

Red	white	blue	Orange	white	violet
orange	white	blue	green	white	blue
red	white	violet	green	white	violet
yellow	white	blue	yellow	white	violet

Nickel appliances appear better when shown against something dark, as the contrast makes them stand out prominently. Copper appliances look best when shown on dark red, blue, green or purple. Appliances which are provided in boxes, cartons. wrappers, etc., should be shown against a background which harmonizes with the prevailing color of the cover.

Show-cards Every display should have at least one show card with descriptive matter. A display without such a card does not carry a message. In most displays several cards should be used, telling of the convenience and benefit gained by the use of electrical appliances. The devices can be understood when descriptive cards are used; their labor-saving and comfort-giving properties can be made apparent to people. Show-card writing is not difficult to learn. It is necessary to have a set of good brushes, which should be taken care of after using by dipping them in water. All ink should be drawn from the bristles and the brushes cleaned thoroughly, flattened to chisel shape and left to dry in that position. The best brushes for show-card purposes are "red sable" chisel edge, in sizes 6, 8, 10 and 12, making strokes 1/8, 3/16, 1/4 and 5/16 inch wide, respectively.

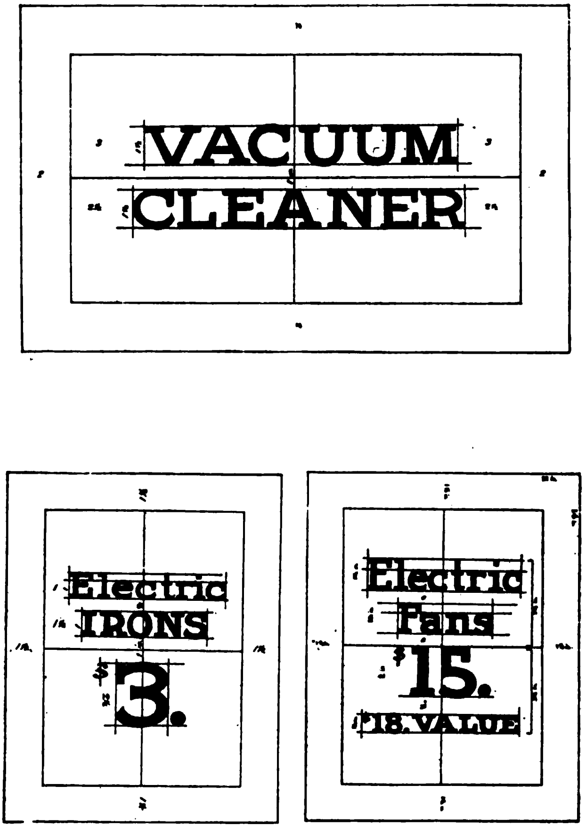


Fig 7—Examples of Show Cards

Prepared show-card inks can be obtained from stationery stores. These are water colors because their excellent flowing qualities are preferred to oils or opaque paint. White six or eight-ply bristol board coated on one side comes in full sheets 22 by 28 inches and can be cut in standard sizes ½ sheet (22 in by 14 in), ¼ sheet (11 in by 14 in) and ⅛ sheet (7 in by 11 in).

Anyone can master the art of lettering by practice. For small cards, pen lettering is in vogue. The pens used are known as "Soennecken," and range in size from Nos. 1 to 6. No. 1 makes a stroke 3/16 of an inch wide.

Price Tickets One of the first questions that enters the customer's mind is "How Much?" Because of this price tickets should be used on appliances in the show-window. A woman is naturally timid in asking questions on appliances she knows little about, and she will not go into the store to inquire; whereas by seeing the appliance, the descriptive matter on the cards and the price, she gets it all, and if she is interested and cannot afford to purchase at once, she will save her money until she can. It is therefore well to show prices on appliances, except in the case of large or expensive specialties where it is necessary to "demonstrate."

SELLING FORCE

Salesmanship Salesmanship in the electric lighting industry differs in some respects from salesmanship in ordinary mercantile business. Each individual residing in the community is a customer or a prospective customer for the product that the lighting company has to sell.

We all recognize the value of confidence on the part of the prospective purchaser in making a sale. There must be confidence in the company the salesman represents as well as in the salesmen individually, and in this connection the question of the public policy of the company is of vital importance to the success of a sales program. The attitude of the officials of the company toward the public is reflected in the every day contact of the sales organization and the company's existing and prospective customers; therefore, if we expect to be successful in merchandising electrical appliances, we must sell and we must convince our sales organization that we are going to sell the right merchandise at the right price, and on the principle that we will give the public their money's worth or their money back.

Attitude of the Company Toward the Customer as Indicated by the Selling Force Sincerity on the part of the house is the first step without which there can be no continued success in any sales effort.

The idea that electricity will sell itself, requiring no skilled sales organization, has been exploded by the knowledge gained from experience in recent years that electrical appliances will not sell themselves. The sale of electrical appliances is followed by the sale of more electricity. In selling appliances, we must adopt the successful merchandising methods of the first-class department store and we cannot over-emphasize the importance of prompt and satisfactory service. When we investigate up-to-date merchandising methods, we soon begin to wonder why our methods are so slow and inadequate. This leads to self-analysis, and the value of introspection lies in the elimination of faults and the development of those positive qualifications on which success is founded.

Selling Force The great trouble with us, both in individual salesmanship and in the training of sales people is that we have very little method in our work.

"We give the new man our schedule of rates or our handbooks, and throw him out of doors to solicit, depending mostly on chance—on the lucky arguments—the inspiration of the moment. He may succeed by instinctive adaptability but he rarely increases in skill, because skill implies method—art." "Even George Cohan has constructed a set of rules for making people laugh. His rules work with the same certainty as do the laws of nature."

We need simple rules governing the basic principles of salesmanship that can easily be followed by the $10 a week clerk behind the counter.

Qualifications It is the consensus of opinion in your Committee that the sales force should be made up of men and women who have the following basic qualifications:

They should have gone through the public school including high school, and before beginning to sell should have the opportunity of learning the practical operating facts about the electrical merchandise that they will handle.

The men should be taken on between the ages of 18 and 25 and women between the ages of 22 and 25. They should speak English well and fluently. Cleanliness and neatness are absolutely essential, and courtesy and cheerfulness in dealing with customers should be constantly suggested. The attitude of our salespeople toward existing as well as prospective customers should be so satisfactory that after the completion of one transaction that customer will experience a feeling of pleasure in going back to place another order with the same sales person. In other words, our sales idea should be that the customer is the boss. We should all recognize the value of a satisfied customer as the biggest asset our companies can have.

Education and Training of Sales People The education of our salespeople in the business routine of other departments of the company must of necessity be slow, but the process should be continuous. A clear understanding of the company's policy toward the public is important as a preliminary to active sales effort.

Regular meetings for the instruction of salespeople as to the electrical and mechanical construction of the merchandise to be sold should be conducted by the heads of the sub-departments, who are closely in touch with the salespeople individually. The most important part about these meetings is that they should be frequent and the program for any given season should have the virtue of continuity. In order to teach the salespeople how to apply the various devices on sale it is necessary to have demonstrations in suitable settings placed in the merchandise stores. Then the demonstrator with his or her special training can teach the others in detail the correct application of the devices. This training should of course be continuous, as the different devices are advertised or pushed from week to week, or month to month. A plan that has proved successful is outlined as follows: Actual sales demonstrations are held at least once in two weeks. A few days before the demonstration is to be held, the commercial manager posts on the bulletin board or gives verbally, the sales problem for the coming demonstration, such as "Sale of Electric Flat-iron to a Housewife at her Home." .At the time the problem is given out, notice is not given to any individual salesman that he is to make the demonstration. In this way the interest of each salesman is aroused and they all make a study of the problem before the time of the actual demonstration. At the time of the actual demonstration some one salesman is picked out to make the demonstration. The salesman carries out the demonstration to the best of his ability, as nearly as possible as it would actually occur. The commercial manager himself may act as the buyer; still better, an outside person, unknown to any of the salesmen.

Before the demonstration is made, the commercial manager should prepare a written examination paper, containing a few questions which should cover the general points of a successful demonstration. At the end of the demonstration this examination paper should be passed around to all the other members of the commercial department and the questions answered by them. The purpose is to bring out the individual criticisms of each man. If there are a large number of salesmen, those who criticise the demonstration first can generally cover the subject pretty thoroughly and the salesmen who are called upon later can simply say that they agree with the previous criticism. The examination paper answered by each salesman brings out his own personal opinions.

The commercial manager then goes over the different questions and answers, and if the individual salesman fails to criticise the demonstration properly, he should be held fully as much to blame as the man making the demonstration. At the end of this time the commercial manager, himself, can make such criticisms as are necessary.

Seasonable appliance campaigns require extra canvassers as a rule, although we shall probably get our business regulated to the point where the campaigns will follow one another so closely that the same force can be retained throughout the year.

Method of Paying Representatives Outside salespeople should be men; women should be employed generally in the stores and shops. More efficient service can oftentimes be obtained from a properly trained saleswoman at $12 per week than from a young man at $15 per week.

We have referred to sincerity on the part of the company and its sales organization as a basic necessity in any sales campaign; that is because only through sincere effort can we gain the confidence of the public, and now the question before the management is how to keep salesmen sincerely confident in the company and in themselves. We, then, come directly to the question of methods of paying our sales organization. In this we can learn from the successful mercantile houses. (1) That the salesman should be paid enough on a straight salary basis to enable him to live comfortably. The amount depends upon living conditions in the city or town in which he is employed, and (2) in addition to the salary, there should be a commission or bonus plan, dependent upon the gross profit in the line of goods for sale; and the importance of the value to the lighting company of the appliances as revenue producers should not be overemphasized.

If we take a given line of electrical merchandise that we intend to sell, decide on an average gross profit to cover the cost of doing business, (which includes the cost of selling) and to provide a fair net profit, we can then determine what percentage of the selling value of the goods should be allowed for sales expense. The average cost of doing business in the ordinary retail mercantile establishment is 27½ per cent. The average allowance for sales expense is 10 per cent. Of this 2 per cent may be set aside for supervision of the sales organization and 8 per cent paid to the salesmen in salaries and commissions. The approximate figure of 10 per cent for selling expenses would apply to the outside salespeople only. As for the inside salespeople, there must be an allowance taken out of the percentage for rental and up-keep of the store.

Now in the case of outside salesmen, what part of the 8 per cent should be flat salary and what part should be commission or bonus; here is where the importance of the volume of sales at the selling value comes in. If the class of merchandise to be sold is such that a great deal of work must be done to create a demand before actual sales can be closed, it will probably be found that even though the entire 8 per cent of the selling price be devoted to flat salary, the salary will still be inadequate; on the other hand, if the class of merchandise is easily sold in large volume, the flat salary should constitute the greater part of the percentage allowance, leaving a nominal percentage only for commissions. In this latter case, the percentage allowance for flat salary would have to be based on an average of the expected volume of sales. As an example:—If it were expected that a salesman would sell an average of $1,500 worth of merchandise per month, 7 per cent would be a fair basis for salary and 1 per cent for commission; or 6 per cent for salary and 2 per cent for commission.

The value of the merchandise to the lighting company in producing revenue may affect the commission, although this entails an elaborate point system, which, because of its expense, should be discouraged or eliminated if possible. It would be better to guide the efforts of the salespeople through proper supervision, and, generally speaking, the seasonable character of the goods will take care of this question to a large extent. As an illustration:—Fan motors are more easily sold in the summer than in winter months. Radiators, on the other hand, are more easily sold in the winter than in the summer months, and it would be foolish to attempt to sell radiators in a season when there is no natural demand for them. The question of selling merchandise to suit the customer's needs also affects this point and there should be no encouragement given to salesmen to sell a 6-pound flat-iron to a customer who wants a tailor's iron; or, a better illustration, it would be unwise to sell a 1500-watt radiator where a 500-watt radiator would amply fill the customer's needs.

In developing new business, the merchandising department is the most important contributory factor. So true is this, that the two departments must be most closely associated, and your Committee recommends that the merchandising department be placed under the supervision of the Superintendent of New Business so that encouragement will be given to the regular lighting and power salesmen to study the customer's needs on his premises, and through the sale of efficient apparatus and equipment insure the greater use of electricity. One of the large progressive lighting companies has gone so far in this direction as to appoint a Superintendent of New Business and Merchandising with all of the lighting and appliance salesmen, and all central and branch store managers reporting directly to him. In this the large company will very closely resemble the small company where the New Business Manager must of necessity have charge of all sales.

INDUSTRIAL APPLIANCE BUSINESS

Scope of Investigation Inquiry as to the amount of special effort directed toward the sale of industrial appliances brought to light the fact that the majority of central stations have altogether ignored the industrial appliance field. Of the 500 central stations replying to inquiries 80 per cent had made no effort at all, 15 per cent were making so feeble an effort that they were extremely reticent as to facts and figures, and 5 per cent admitted having made some effort, but the amount of business reported certainly could not be considered by any Committee as sufficient basis for a report.

Ninety-nine per cent of the central stations have expressed hearty approval of the idea that this class of business should be sought, all admitting the revenue to be derived and the majority stating that considerable opportunity for additional business exists in their territory, yet not one reply contained an adequate reason why more of this class of business had not been secured. Ninety-seven per cent of the central stations recommend the adoption of their own standard power rate for industrial installations.

Central stations having a few industrial installations acknowledged that most of them are of the small class of standard appliances, such as glue pots, soldering and branding irons, wax melting kettles and small motor-driven outfits, with an occasional furnace, oven or special heater. Many admitted that they were obliged or were willing to leave the industrial business in the hands of the manufacturer, expecting him to secure it with or without their aid.

Reasons for Poor Results Apparently, the chief reason for the small amount of business obtained is that little or no attempt has been made to secure it, most of the central stations having felt that there was not sufficient business to warrant paying any special attention to it. The business has seemed to be too small for the power salesman and too large or complicated for the domestic appliance salesman, and between the two it has been neglected.

No central station could hold this belief if it made an analysis of its own industrial field and had adequate information in regard to the electric industrial appliances that are on the market, or the special applications to which electricity has been or could be applied for heating purposes.

Almost without exception central stations have criticised manufacturers for the prohibitive price of industrial appliances, and equally without exception manufacturers have criticised the central stations for the prohibitive rates quoted for the operation of industrial appliances. The cost of constructing the appliance is the reason offered by the manufacturers for its high price and it is contended that prices cannot be reduced until a larger demand has been created by the central stations.

It is a fact also that most central stations have let the manufacturers take the initiative in developing the industrial appliance field, the central stations merely furnishing the leads. The wonderful increase in the domestic appliance business, as a result of the combined efforts of central stations and manufacturers, is positive proof of the value of co-operation, and this fact should be sufficient to stimulate a still greater co-operative effort in securing industrial business.

FUTURE INDUSTRIAL APPLIANCE BUSINESS

Importance of this Business Any additional revenue that can be obtained with practically no additional investment in line and station equipment is of importance. As a simple illustration consider the electric iron used in public laundries six hours a day for 300 days a year. This yields a current revenue of 1080 kilowatt-hours per iron. Again, a 15-pound iron used in the average tailor shop, four hours a day for the same period would yield a current revenue of 960 kilowatt-hours. Other illustrations could be given without number. Prospects will suggest themselves to any new business man on looking over the list of appliances in the Addenda.

The steady and ever increasing off-peak business yielded by industrial appliance installations proves "current revenue" to be the most essential reason for the development of this class of business. Immediate results cannot be expected as considerable time will be employed in creating the demand and some time must elapse before results of any value can be obtained. The amount of revenue derived from various installations already made encourages us in the belief that if central stations, especially those in manufacturing centers, would for one year attempt in a logical and persistent manner to secure industrial appliance business, employing standard stock and special appliances, the result would prove so gratifying to all concerned that further argument would be unnecessary.

Analysis of the Market In the territory of every central station will be found some market for industrial appliances. Those in manufacturing centers will naturally secure a large amount of industrial business, but even where there are no manufacturing industries there are opportunities. All central station territory includes restaurants, cafes, butcher shops, grocery stores, barber shops, hair dressing and manicuring establishments, laboratories, drug stores, garages, schools, machine or general repair shops and other possible users of industrial appliances.

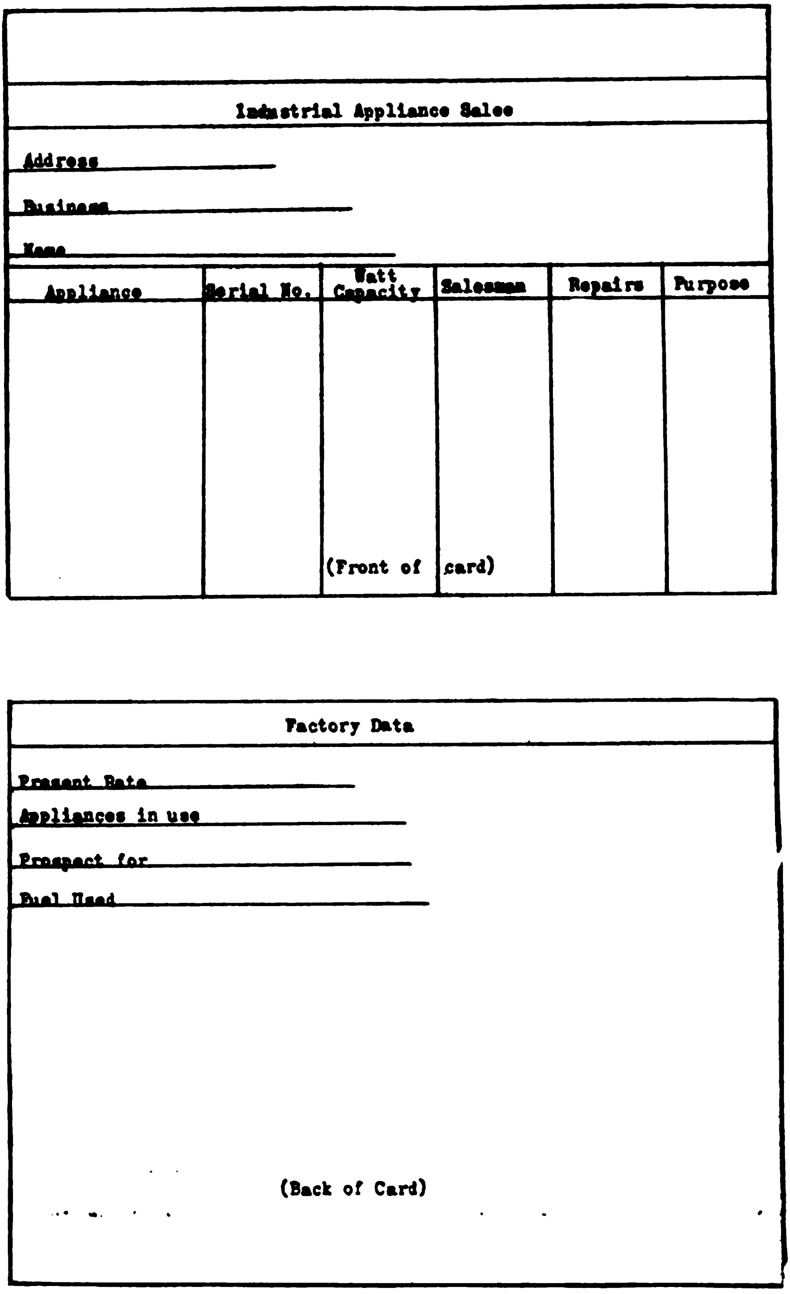
In analysing the market for this business the making of a classified prospect file is an absolute necessity. The Committee suggests a file in the form of a card index listing the various industrial prospects, classified in small towns according to the industry and in large towns, in two files, according to the industry and to the street. A sample of such a card is seen in Fig 8.

New business departments have been given much attention and widespread publicity. There is nothing newer for the central station to cultivate than industrial appliance business. It should be the work of the new business department to secure this class of business.

Available Apparatus The various manufacturers have catalogued a certain number of standard appliances for industrial uses, and from time to time they make appliances for special purposes, but the present meagre amount of catalogue information is so wholly inadequate for the industrial salesman that we embody in this report a classified list of industries together with the appliances available for each industry, including a directory of manufacturers from whom these devices may be secured. The Committee invites comment, discussion and additional suggestions to render this list more complete, and suggests that manufacturers in their future catalogues and pamphlets do not, as heretofore, confine their data to watt capacity, superiority of construction and price, but insert some information as to the possibilities of the device and how to use it in order to secure the greatest efficiency.

The Committee suggests also that the Committee on the Electrical Salesman's Handbook prepare data sheets on industrial appliances, giving complete data thereon and listing the industries in which each appliance may be used.

Type of Representative and Suggestions for the Department The consensus of opinion as to the best sort of man to employ seems to be in favor of the non-technical man, yet this Committee recommends the technical man possessed of sales ability and a knowledge of the use of electrical appliances. A non-technical man of good sales ability and long experience would doubtless be able to secure a large volume of business, but the man with a technical education is equipped with knowledge suffi-



Industrial Appliance Sales

Address ______________

Business ________________

Name ____________________

Appliance	Serial No.	Watt Capacity	Salesman	Repairs	Purpose

(Front of card)

Factory Data

Present Rate ______________

Appliances in use ______________

Prospect for ______________

Fuel Used ______________

(Back of Card)

Fig 8—Sample Card Suggested for Industrial Appliance Prospects (Size 4 in by 6 in)

cient to approach any factory expert and present his arguments intelligently. A large majority of factory superintendents are men with technical education, graduates of technical colleges, who immediately recognize and appreciate an argument which is able to sustain itself technically. Factory business is what we want, but the approval and co-operation of the factory representative, based upon his confidence in our ability and our statements, is what we absolutely need.

The representative should also be entirely familiar with the Underwriters' rules pertaining to special heating equipments, and familiar with conditions attached to insurance rules. In establishments where the fire risk is great rates are usually higher, and an electrical installation offers the chance of a possible reduction in rates.

The salesman should also be thoroughly familiar with wiring rules as most industrial appliances require special wiring, and unless they are properly installed trouble may occur.

The regular method of conducting the central station's sales department would naturally govern the manner of obtaining this business.

The Committee recommends that the man assigned to this work be connected with the appliance department, under the supervision of the sales manager, but in close touch also with the power representatives, as he will require their assistance in collecting information as to the desirability of the installation and their co-operation in securing leads for additional business.

STOCK

There is considerable difference of opinion as to the amount of stock which should be carried for an industrial appliance business. Most of this business obtained will be of a special nature, consequently, samples for this class of business are out of the question. It will be advisable, however, to carry at least a sample line of the smaller standard appliances for display and demonstration. For instance, one glue pot as a sample is not sufficient since there are different types designed for different purposes, as a certain type for a carpenter shop another for a bookbindery, and still another for a pattern shop. There are various weights and shapes of tailors' irons, laundry irons, hatters' irons, etc., and hot plates or disc stoves for a variety of purposes. Keep two or three sizes of soldering irons and two or three sizes of a special type of radiator, designed to be adjusted to various standard makes of machines and used also in several ways for drying purposes.

FUTURE INDUSTRIAL COMMITTEE

Industrial appliance business in its present elementary stage has been found so full of possibilities that the Committee wishes to establish a permanent means of acquainting all central stations and their representatives with the work being done from time to time. Frequently installations are made the nature of which would be of interest to central stations, but because no publicity is given to them, no general benefit is derived from the experience gained.

The *Electrical Review and Western Electrician* and the *Electrical World,* through their respective Managing Editors, Messrs. A. A. Gray and A. S. McAllister, both members of this Committee, have agreed to co-operate with the National Electric Light Association and all central stations. They offer space in their magazines for the production of articles and data pertaining to all industrial applications or installations. They request that merely the facts (with photographs where possible) pertaining to these installations be forwarded and they will have them presented in an interesting and instructive manner. This method of publicity will materially help those engaged in the industrial appliance field, and the suggestion should be responded to by all interested in this class of work.

Your Committee recommends the appointment each year of a committee, separate from the regular Merchandising Committee, whose duty it will be to cover the subject of industrial appliances in its entirety.

The Committee recommends also that it be a part of the duty of the next Committee on Industrial Appliances to secure articles for publication in the two magazines mentioned, and see that such articles are regularly furnished and published throughout the entire period of their office, embodying in their final report a synopsis of the publications made throughout the year.

A FEW INSTALLATIONS PLACED ON CENTRAL-STATION SERVICE

To strengthen our recommendation that industrial business be zealously sought, we call your attention to a few of the successful installations made through the efforts of central stations that have already secured business. Many of these installations have been made with standard stock appliances. A few are of a special nature, but they all indicate the success possible in this class of business.

Concentrated Lighting for Use with Factory Sewing Machines Correct lighting being the first essential in our industrial efforts, we wish to mention one successful installation where the efficiency of the lighting equipment and the satisfaction of the factory manager paved the way for industrial appliance business in the form of an installation of corset irons. This equipment was installed in the sewing room of a corset manufacturer where very fine and narrow lace was stitched on the corsets. Arm fixtures were extended from a central conduit over the sewing tables, each fixture being equipped with a small steel reflector, placed so that every unit of light energy was concentrated directly upon the needle, affording the operator absolute protection from eye strain. (See Fig 9)

Corn Popper The post corn popper, designed for public places, is used in Chicago. The machine works continuously in practically the same manner as one of the every day gas machines, popping approximately 60 bags of corn per hour. Equipped with two Simplex heaters of 12 inch plates and controlled by means of a rheostat, either or both sections may be operated at one time and the rate of popping is controlled also by the rheostat. With both sections in operation the popper consumes approximately 1½ kilowatts and is operated by a 1/6-hp motor.

Bakery Oven A Simplex oven of 10-kw capacity was installed in Chicago. This oven has 26-sq-ft of baking surface divided among five shelves, each 20 by 36 inches. The capacity of the oven at one baking is 80 to 90 one-lb loaves. Outside dimensions are width, 3½ feet, depth, 2½ feet, and height, 6 feet, including a mercury thermometer mounted at the top of the front which shows the temperature of the baking chamber. The installation is reported to be entirely satisfactory.

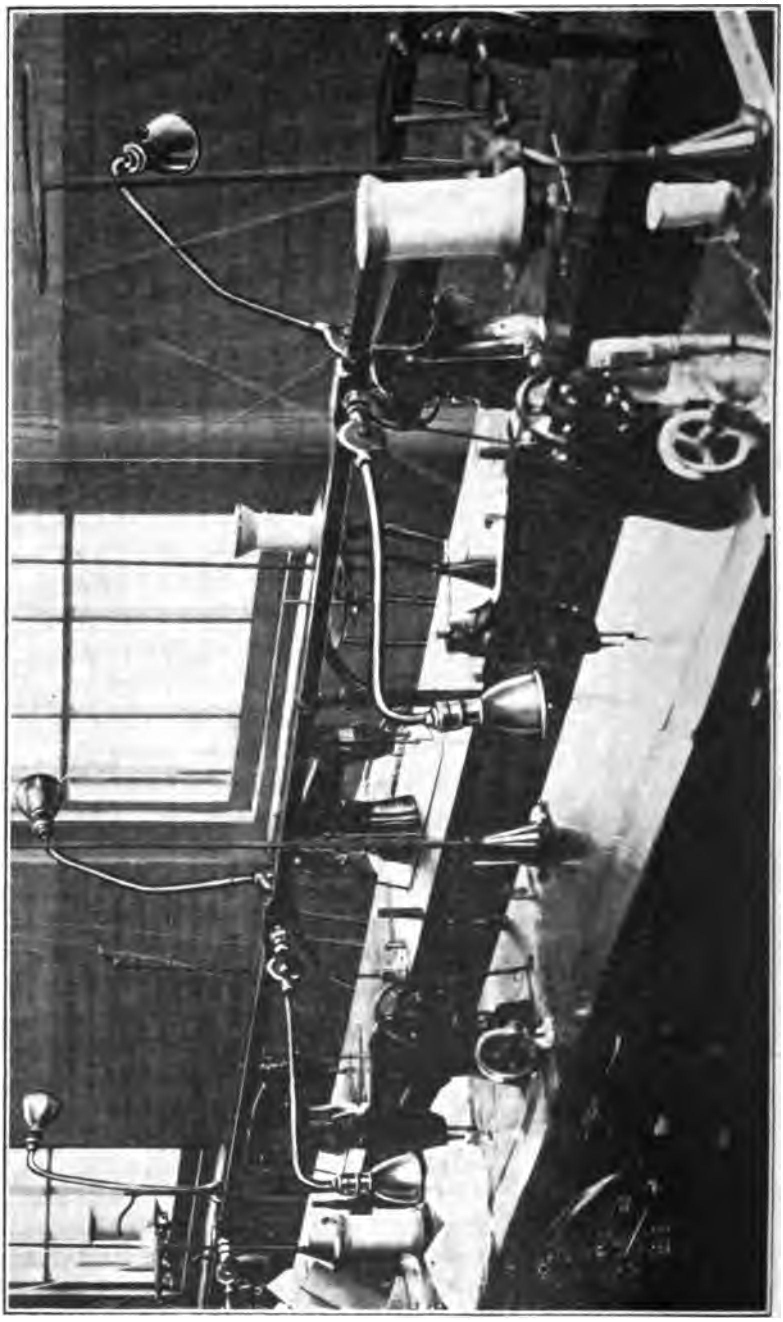


Fig 9--Concentrated Lighting for Sewing Machine Work

Japanning Ovens We note one installation made in Detroit of five large enamel baking ovens. The electrical equipment of each oven consists of thirty-six 220-volt, 840-watt, General Electric tubular type, special heating units. These ovens have a good load-factor and a very high power-factor and are, consequently, a very satisfactory installation. The successful result of this installation, we understand, has caused some of the manufacturers to standardize three sizes of japanning ovens.

Spot Welder In Baltimore there were installed two 15-kw, 60-cycle, 220-volt, type S-24, Winfield welders. Fig 10 shows one. Notice a switch bringing in single-phase current, an 8-point dial switch on the side of machine to vary the connections on an internally contained auto-transformer for adjusting the strength of current to the thickness of the weld, and the water pipes which convey water for cooling the dies. From two to six volts are used in making the welds and the power-factor varies from 70 to 85 per cent, according to the way the work is handled. One feature is an automatic device in the operator's handle which switches the current on only after the dies and metal are in contact, and switches off when the weld is made, avoiding an excessive arc.

Records of 6000 welds per 10-hour day are not unusual on the side oven linings shown in the cut. 10 800 welds per square oven ranges and 1000 handles of 18 gauge are welded to pans of 24 gauge in the same length of time. During the past year the consumption has averaged about 150 kw-hr per month.

Spot Welder A Toledo welder, No. 140, was installed in Baltimore together with a rotary converter. The maximum capacity of the welder was 20 kilowatts, and in operation it was welding No. 16 gauge sheet-steel. (No other information furnished.)

A two-month's test made on a Toledo welder, No. 172, capacity 15-kw, spot welding No. 16 gauge sheet-steel, showed the following result:

Power consumption	171.5 kw-hr	Power consumption per 1000 welds	2.04
Number of welds made	84 000	Cost per 1000 welds @ 1 cent per kw-hr	0.0204

Matrix Dryer In Baltimore also is an installation of three Wesel matrix dryers, rated at 100 amperes, working on 240 volts,

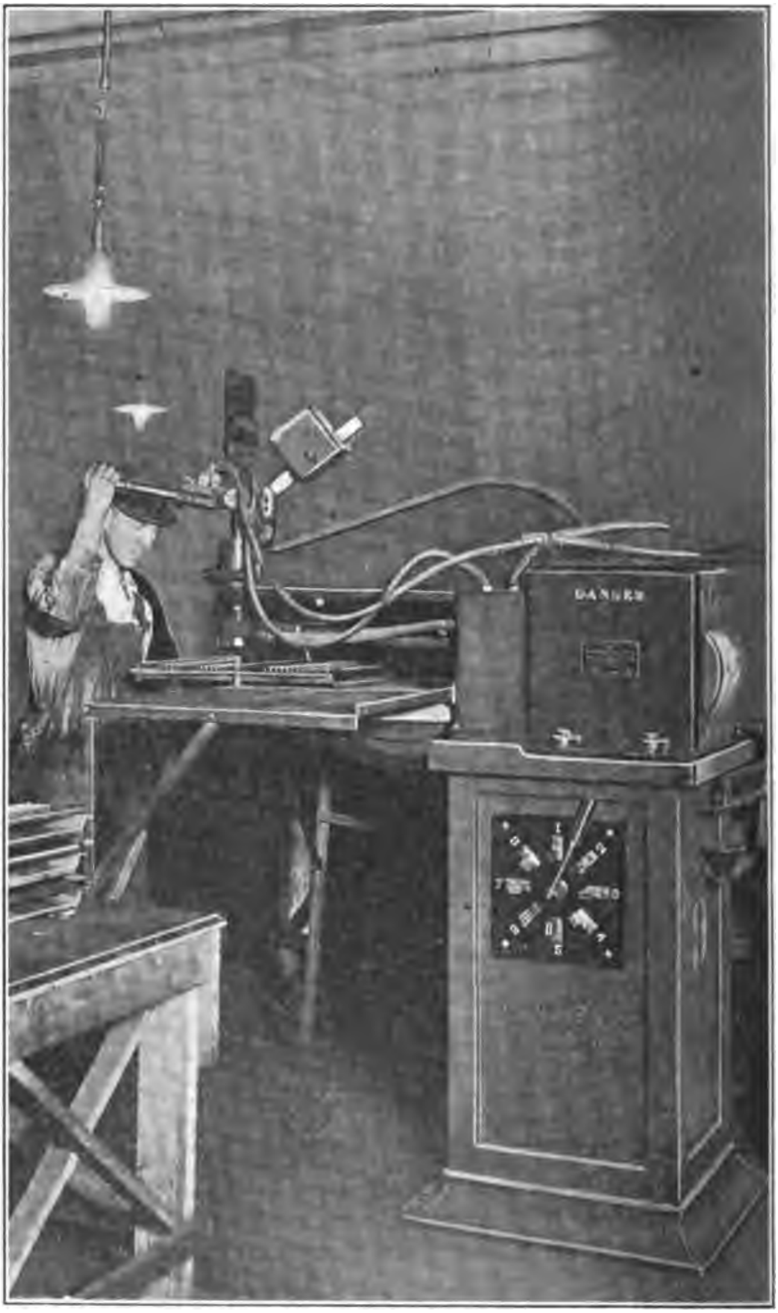


FIG 10—WELDING MACHINE

working temperature 308 deg fahr., equipped with automatic cut-outs which regulate the temperature, cutting off the current when the fixed limit is exceeded. These dryers average 3 minutes to the matrix and have been in use for five years.

Another installation in Baltimore is three Hoe dryers. These dryers are of a later type, rated at 45 to 50 amperes, working on 240 volts, working temperature from 300 to 400 deg fahr., averaging from 2 to 3 minutes to the matrix. They are not equipped with any automatic regulating device, but have signals which indicate when a certain temperature is exceeded.

Special furnace In New Jersey there was installed a Hoskin's furnace for re-finishing metals of the platinum class. This electric furnace replaced a gas furnace and blower and is reported as perfectly satisfactory. Its capacity is 60 kw, giving a temperature of 3600 to 4000 deg fahr., requiring ½ to ¾ of an hour to heat to necessary working temperature. (See Fig 11)

Electric Steamer Equipped with 5-kw Simplex heaters and used in New Jersey for making tests in the laboratory analysis of cement. The water is heated by five coils in series, wound on 11/16 mandrel, 20 in long, 11 turns per in alloy wire, insulated with sheet mica, 3/16 rod through center of coil with hard rubber taps at each end. These coils were tapped on a 550-volt, direct-current line.

Special Heater In Detroit a 3-kw heating unit is used in the process of preserving various kinds of cheese. The heating unit is immersed in paraffine which is heated to and maintained in a liquid state, the cheese being dipped into this at regular intervals. Current is used on this unit six hours per day.

Special Heater General Electric tubular heaters were placed under the paper of a large printing press to warm the paper and decrease the effects of the static electricity in causing the sheets to adhere to each other.

Japanning Oven A General Electric japanning oven is used by a manufacturer of cutlery in Antrim. This oven has a capacity of 5000 knife and fork handles, requiring ten to twelve hour's treatment with King slow-baking japan. The work is placed in oven at night and left in operation until morning. The average number of pieces at one baking totals 4500 with an aggregate weight of 562½ pounds. (See Fig 12)

Solution Tanks General Electric solution tanks are used by

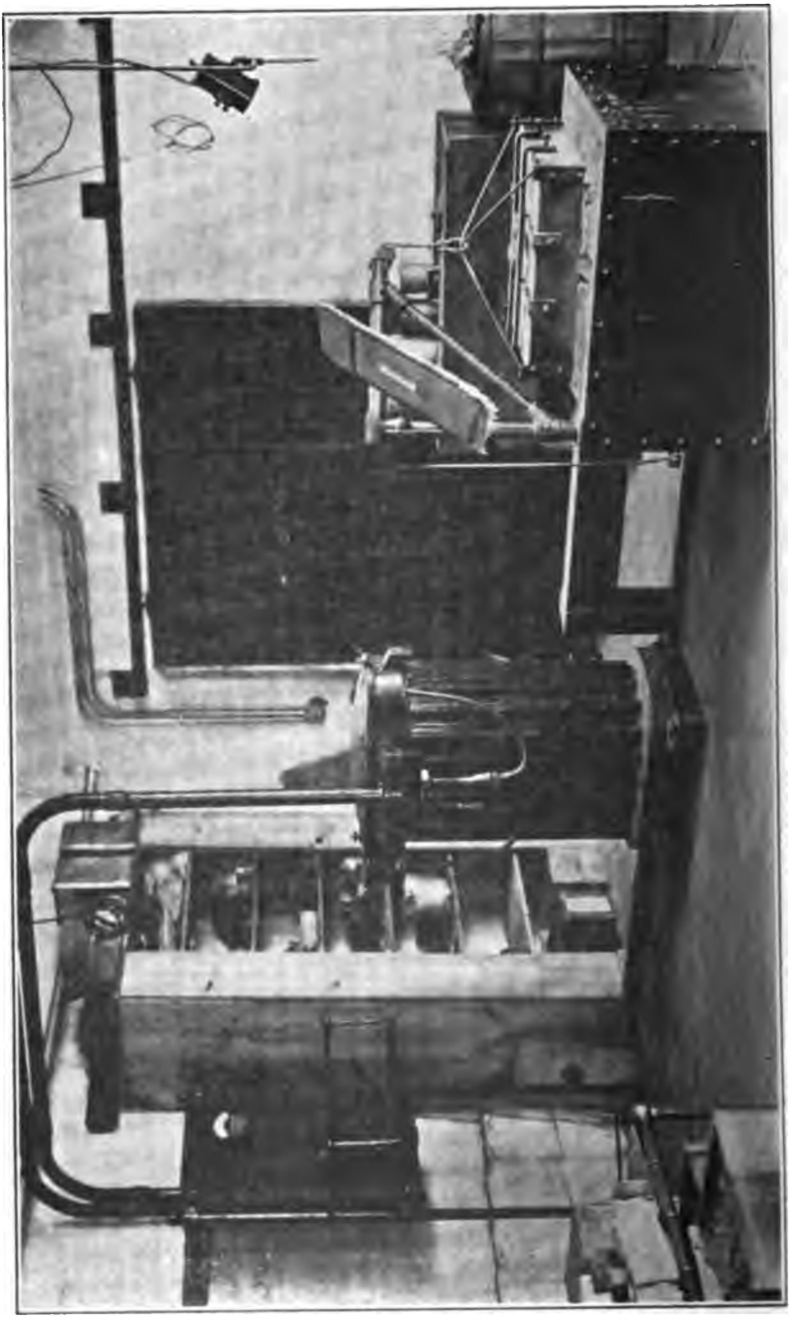


FIG 11—HOSKINS FURNACE

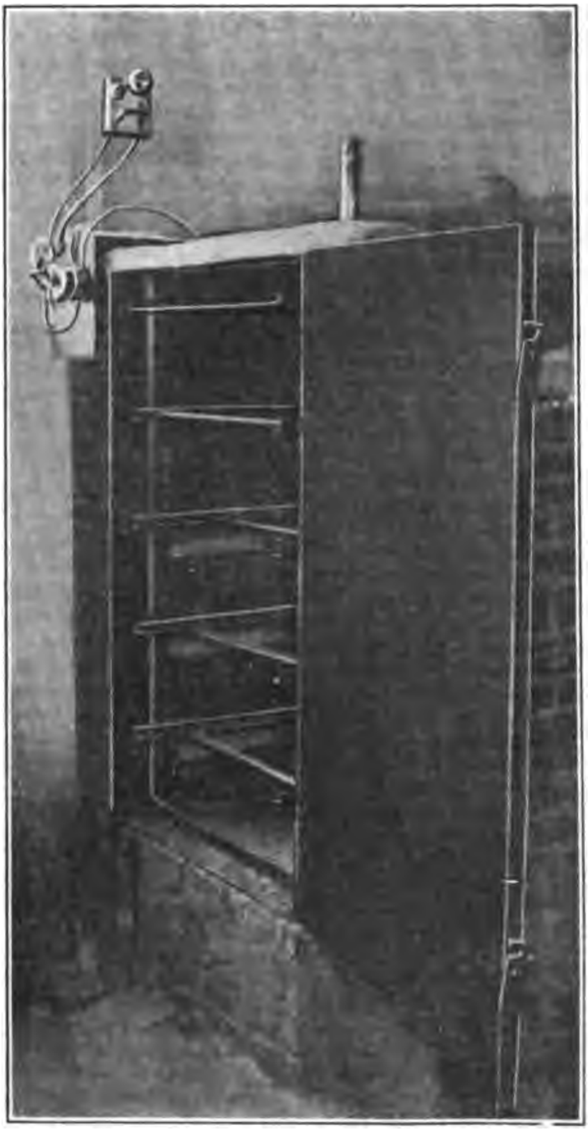


FIG 12—JAPANNING OVEN

this manufacturer in the silver-plating department. A cast-iron water tank was equipped with three 1000-watt cartridge-heating units in which water is kept boiling. The potash tank about the same size is equipped with two of the 1000-watt cartridge units in which the solution is kept hot but not boiling. A copper bath of similar size was equipped with one 1000-watt cartridge unit and arranged for continuous circulation, the solution being maintained just warm. (See Fig 13)

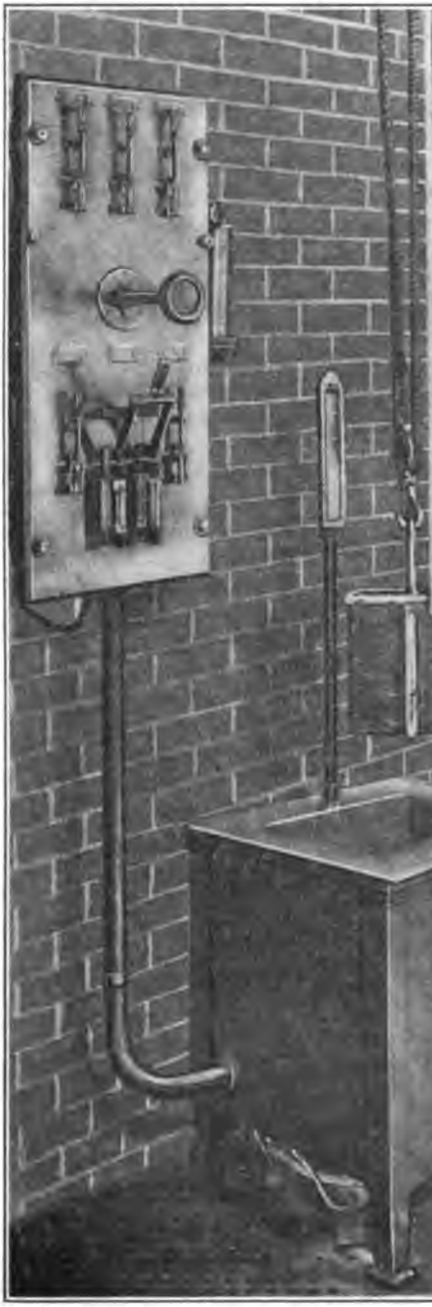
Melting Pots For this same manufacturer General Electric melting pots were installed which maintain the molten metals at the proper working temperature. They are put in circuit before the day's work is started and are ready for use when the factory begins operation. They are used for melting tin, lead, solder, babbitt metal and similar alloys. (See Fig 14)

Hosiery Forms General Electric electrically heated brass forms for finishing and drying hosiery are used by a Philadelphia manufacturer. This equipment supersedes a steam process and the manufacturer reports the electrically heated forms to be much more satisfactory than the steam. (See Fig 15)

Oil Tempering Baths General Electric baths No. 3 are used in Philadelphia by a manufacturer of ball bearings, the superior quality of which requires a reliable method of tempering. (See Fig 16) The bath is used for tempering 350 to 1000 pounds of ball bearings. The drawing temperature of the different grades of steel ranges from 300 to 320 deg fahr. Two hour's time is allowed for raising the charge to drawing temperature. The temperature of the oil is indicated by a thermometer placed in a recess at the end of the tank and controlled by regulating switches which vary the amount of energy consumed. General Electric baths, No. 2, similar to the No. 3 are used by a manufacturer in New Hampshire for tempering the blades of butcher's knives.

Film Drying Constant temperature being necessary in the film-drying room of a motion picture company in New Jersey, fourteen 550-watt electric heaters were installed for emergency use, in the event of an accident occurring in the steam plant. This installation being an emergency equipment only, the current revenue is not great.

Gold Beaters A New Jersey establishment handling large quantities of gold leaf has installed six special Simplex heaters



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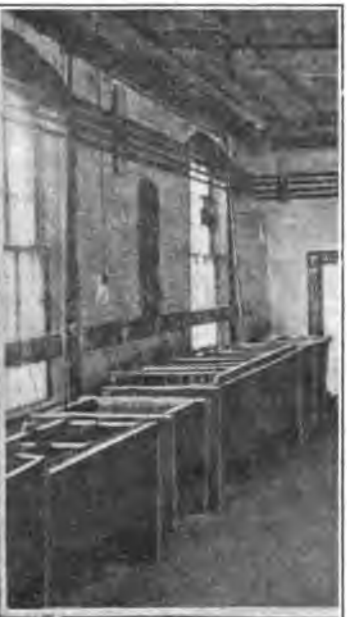

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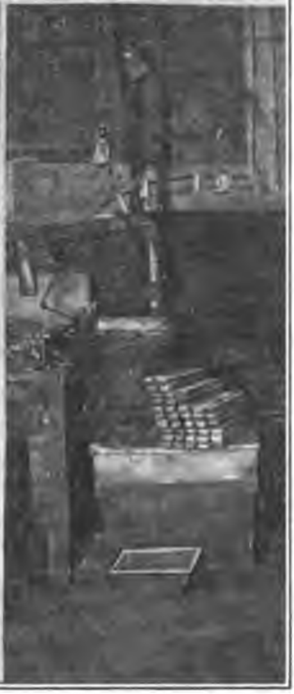

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FIG 13—SOLUTION TANK FIG 14—MELTING POT
FIG 16—OIL TEMPERING BATH

for use as "gold beaters." They are used in connection with small presses for drying out moulds. A mould consists of a pack of from 500 to 1000 bullock skins 4 inches square, between which the gold is placed during the process of beating out. These skins are sensitive and absorb moisture which, if not dried out during the process would cause the gold leaf to adhere to the skins. Fifteen to twenty minutes are required to dry out one package. The heaters consume 6 amperes on 115-volt service.

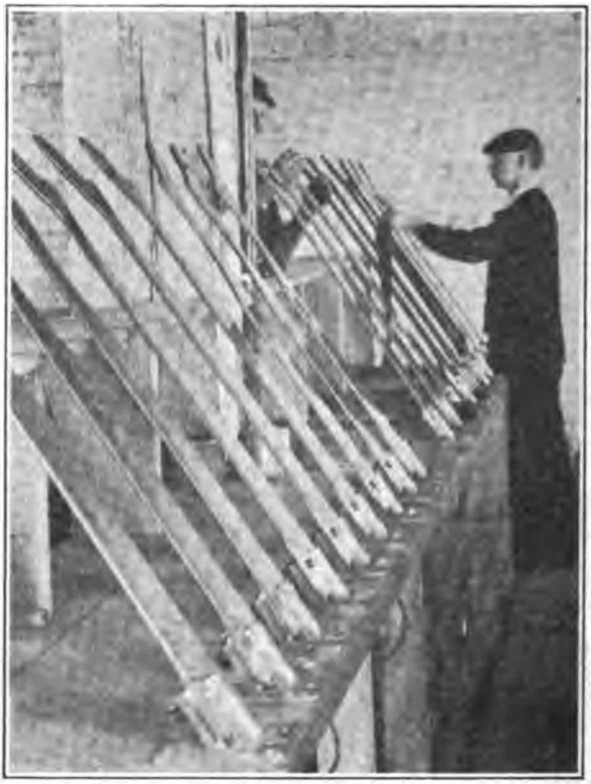


Fig 15—Hosiery Forms

Steel Furnace In Buffalo a 700-kw furnace has been installed. The furnace operates at night at which time castings are poured into moulds made during the day. The success of this furnace has caused the company to install a second and they are negotiating for the equipment of a 40-ton gray-iron foundry, which will require approximately 2000 kilowatts. The enthusiasm resulting from the installation of this furnace induced one company to install a furnace consisting of an iron receptacle, brick-lined, through the sides of which three carbon electrodes are inserted. This furnace is a 3-phase, Stassano type, and will be operated by 110-volt, 3-phase, 25-cycle, alternating current. It can be operated successfully with a charge of between 1 and 1¾ tons of scrap-iron. After each charge is melted the current is turned off for one hour to allow for pouring of molten metal and re-charging the furnace.

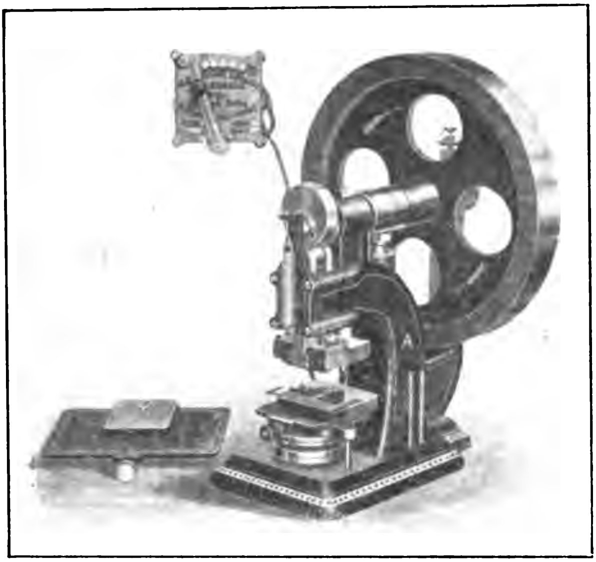


FIG 17—EMBOSSING MACHINE

Special Shoe Machinery An equipment of special machines for the manufacture of shoes is now in use by the Emerson Shoe Company in its Massachusetts factory.

Embossing machine — used for stamping leather facings on the inside of shoes (See Fig 17)

Folding machines, etc — for folding leather or cloth

Seam-rubbing machines — for pressing down rough seams (See Fig 18)

Flat-irons—to heat rubber cloth for cementing it to cloth or leather (See Fig 19)

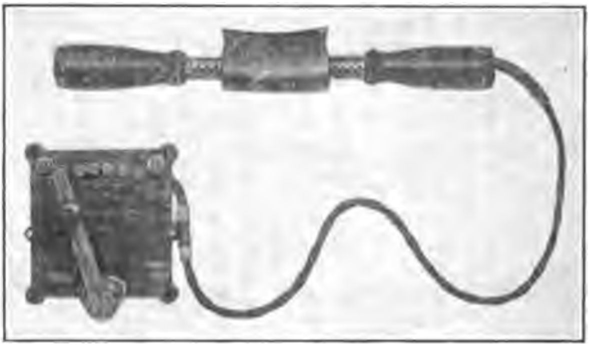


Fig 18—Seam Rubbing Machine

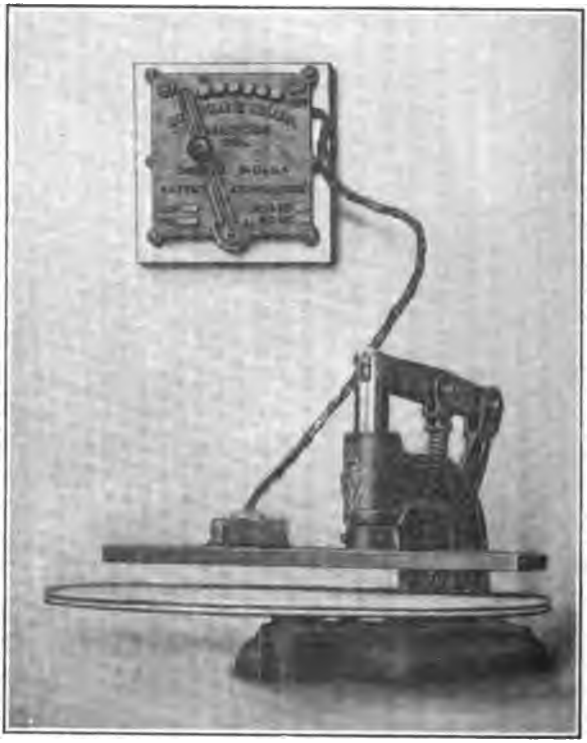


Fig 19—Flat Iron

Crimping machine — for shaping into the vamp the front part of a congress shoe

Iron — used for smoothing out light vici leathers and in shaping up shoe tops

Stamping machine — for heating a stamp or die to brand the bottom of a shoe

Wax-knife heater — with opening for heating a flat knife used to lay wax in covering up defects in the heel and edge

Iron — for smoothing out wrinkles at the toe of shoe, on patent leather work only. This iron will not work on other leather because of the oil in the tanning.

Altar Bread Machines In numerous institutions throughout the country altar bread is made by electricity. One institution in Peekskill, N. Y., uses eight of these. They are similar to a waffle-iron in design but the baking space inside is only about ⅛ of an inch. Machines are furnished in various sizes from six to eleven inches in diameter with an average current consumption of 800 watts. These machines are stamped on the inside which appropriate designs for various sizes of wafers, and heaters are applied on both sides for rapid and even baking.

Roof Tank Heaters Various factory and loft buildings are equipped with radiators or special heaters to keep roof water tanks from freezing. One New York installation is on the roof of a loft and factory building equipped with a 50 000-gal water tank. Simplex radiators with a total of 5-kw capacity are installed in the air space between the tank and the roof, maintaining the water at a temperature of 36 deg fahr. The thermostat regulating the heaters is installed in the same space but the switches for regulating the equipment are below in the building. This same building, not being heated, has an equipment of radiators in a room where the valves regulating the sprinkler system are installed.

Pencil Die Heaters One installation in the factory of Eberhard Faber on Long Island consists of 50 die-heaters used for stamping the gold leaf on pencils. These are special Simplex heaters made to fit the standard pencil-stamping machine and are approximately 2½ by 5 in in size and arranged to take the type used. One heater is used on each machine, each heater averaging 80-watts current consumption.

Circulation Water Heater In the Boys' Club at Norwood, Mass., they use a 30-kw, General Electric, circulation water-heater to heat the water of the swimming pool.

STANDARD APPLIANCES USED FOR SPECIAL PURPOSES

Special Branding Iron It is a great advantage to the manufacturer that the type may be removed from this brand for the purpose of changing the lettering. Brass type are used and the current consumption is 600 watts.

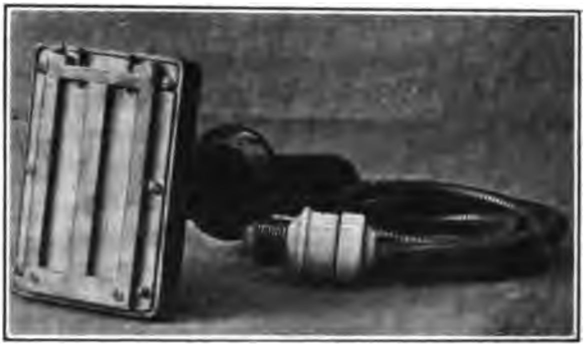


FIG 20—BRANDING IRON

Bayonet Heater A special type of heater for general application applied to a hot-water boiler for heating railway pinions.

Hospital Sterilizers Standard hospital sterilizers are used with a special type of heaters. (See Fig 21)

Chocolate Warmers A standard type used by confectioners is here shown electrically heated. (See Fig 22)

Linotype and Monotype Pots Electrically heated pots applied to standard Mergenthaler linotype machines. These pots average a running capacity of 800 watts. (See Figs 23 and 24)

Embossing Presses Standard press, motor-driven and electrically heated. (See Fig 25)

Standard press for hand operation, electrically heated. (See Fig 26)

Hatters' Apparatus Standard apparatus, electrically heated —hat blocks, hat presses, flanging bags, finishing irons, curling irons, flat-irons and velouring stoves. (See Fig 27)

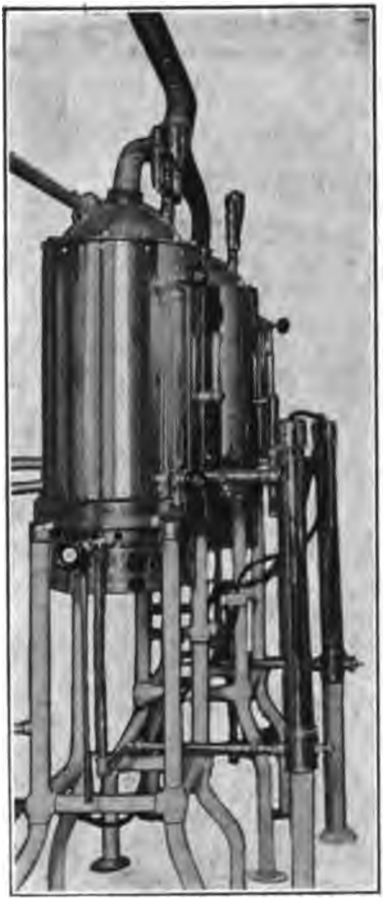


FIG 21—HOSPITAL STERILIZERS

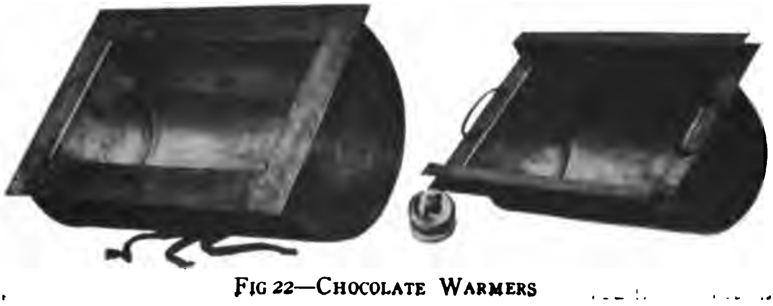


FIG 22—CHOCOLATE WARMERS

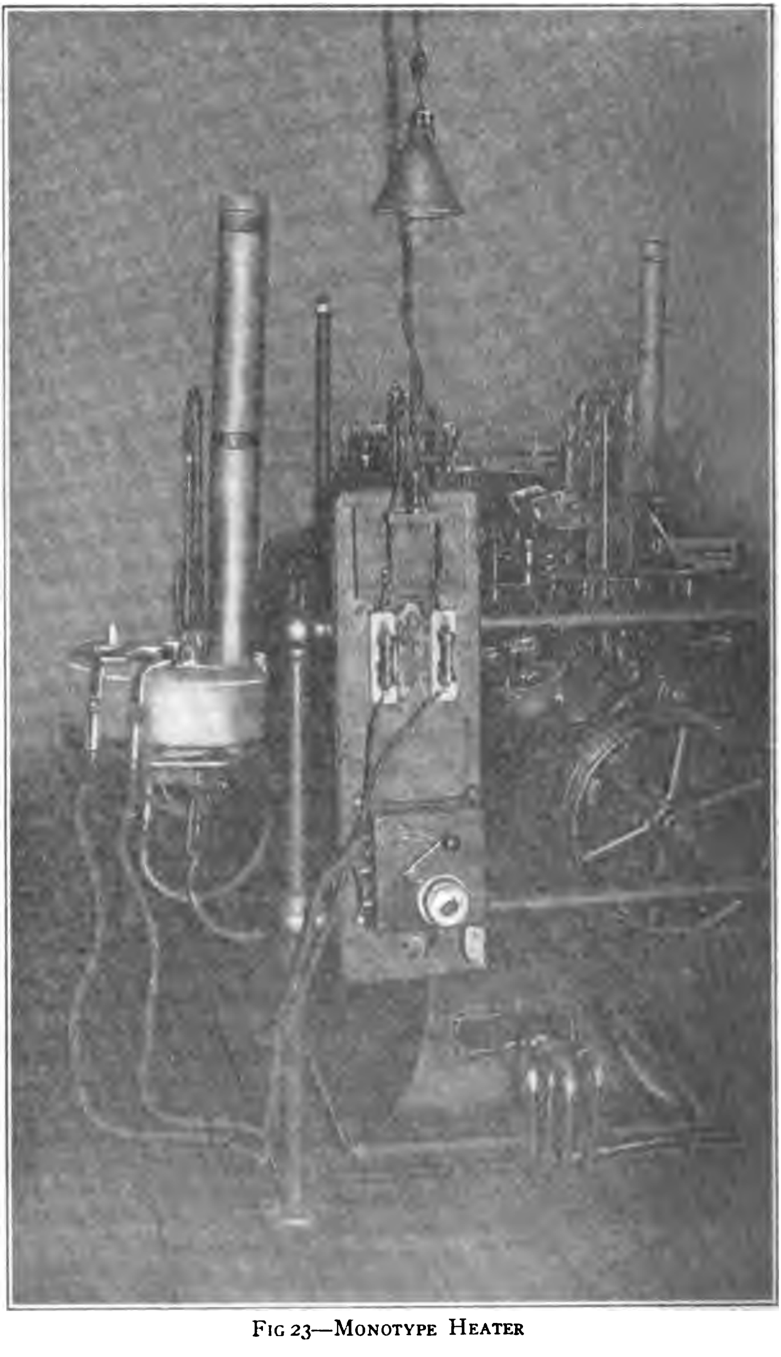


Fig 23—Monotype Heater

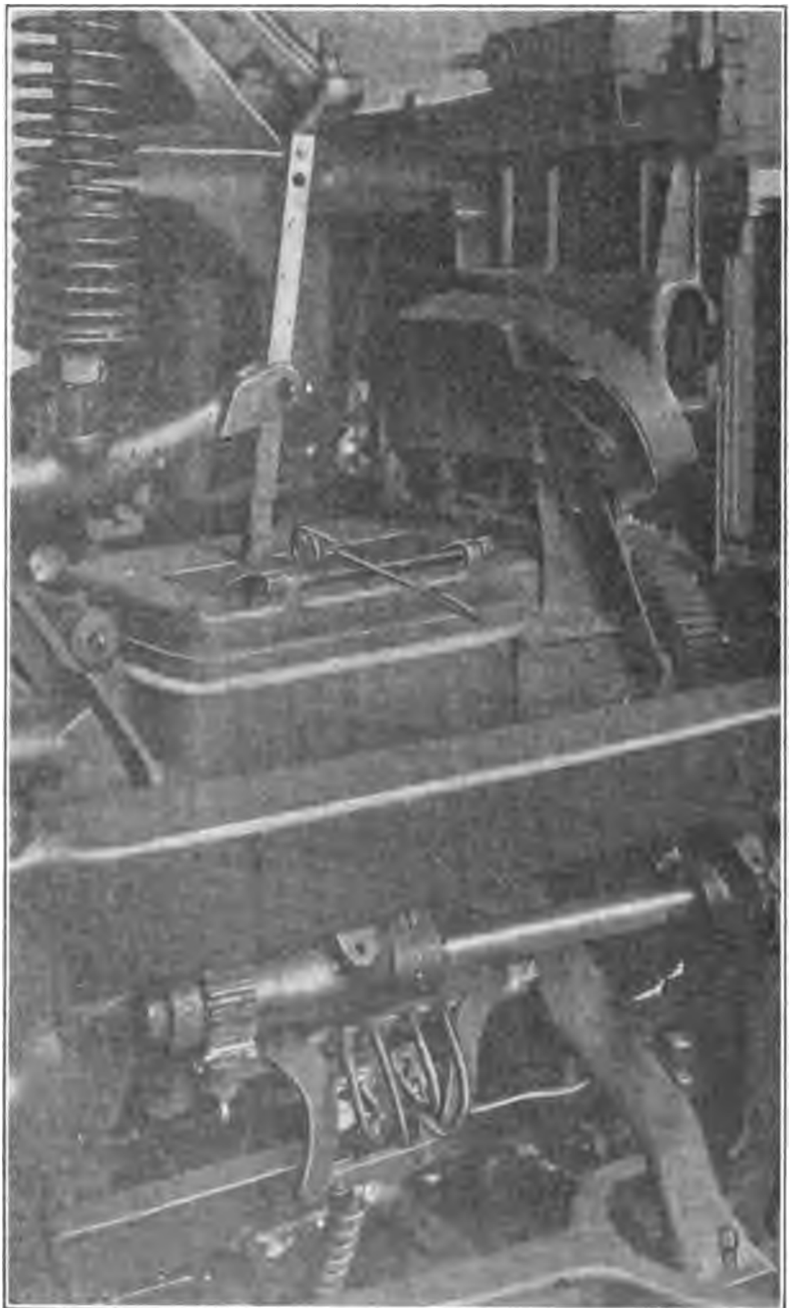


FIG 24—LINOTYPE HEATER

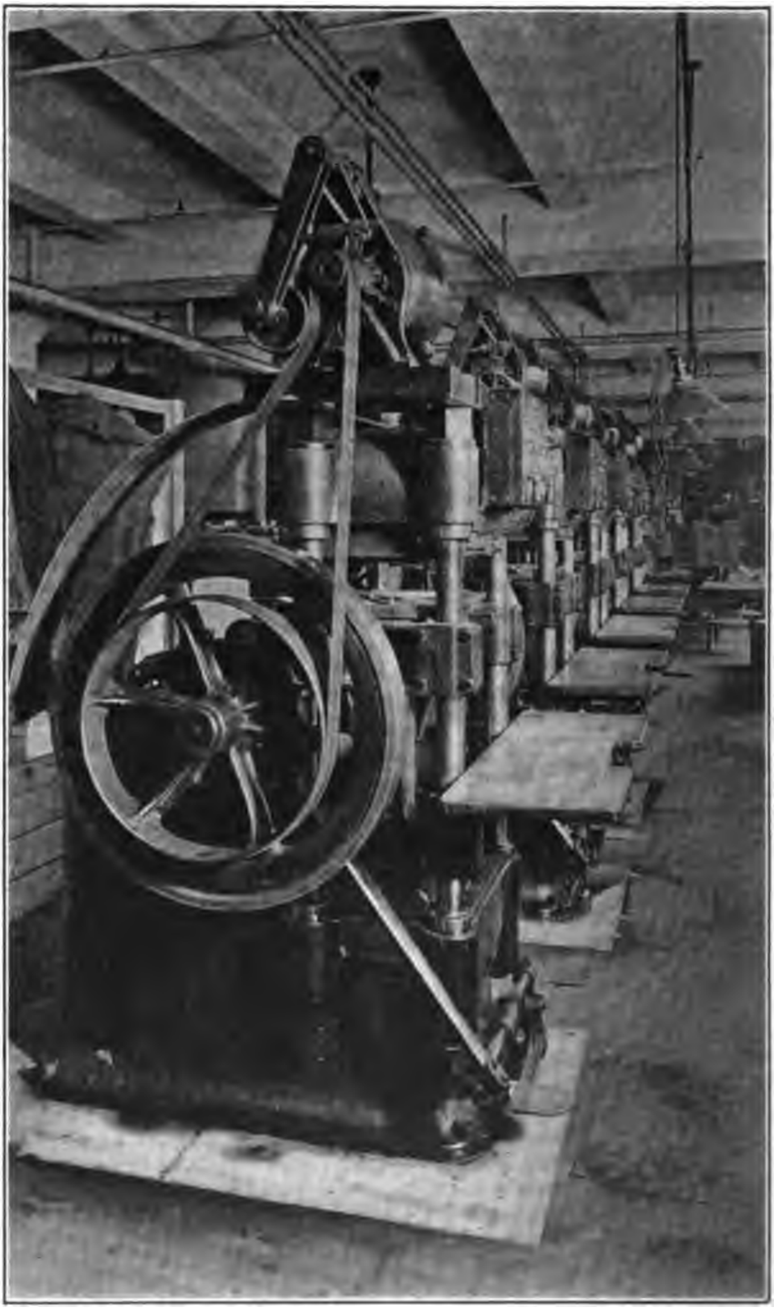


FIG 25—EMBOSSING PRESS

Beer Vat Dryers These are used for drying out beer vats preparatory to scraping and cleaning. They are made of sheet metal casing with cast-iron ends and center section, and equipped with tubular heaters covered top and bottom with wire mesh screen.

Press Heads and Press Blocks These are for installation on presses, standard and special equipments in watts capacity according to requirements.

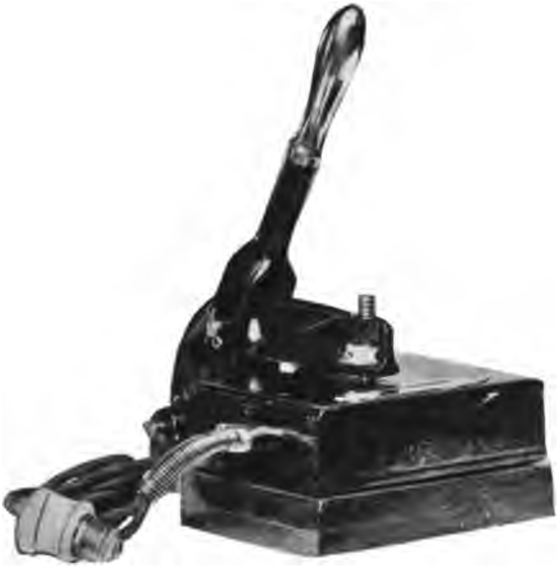


FIG 26—HAND EMBOSSING PRESS

Back Shaper Heaters for use in binderies. They are used in shaping the backs of books; current capacity according to requirements.

Celluloid Die Heater These are used for stamping out a number of dies at one time; all mounted on one head; current capacity according to requirements.

Batch Warmer Heaters used by confectioners for keeping a mass of candy mixture in plastic condition while it is being worked into the desired shapes and finished before being allowed to harden.

Special Heater These are used in New Jersey by manufacturer of optical goods for softening celluloid threads for making frames, etc.

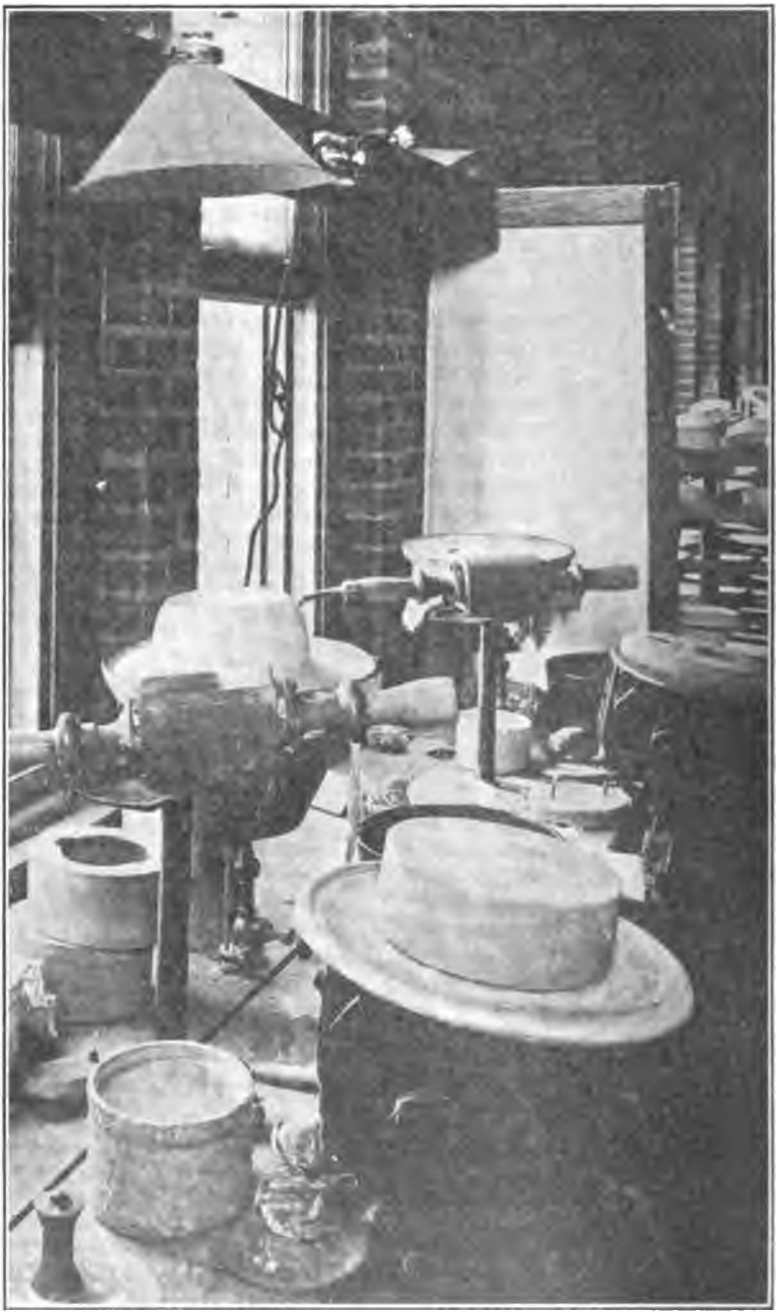


Fig 27—Hatter's Apparatus

A special hot-plate, perforated, to allow passage of air; three-heat control, 550 to 750-watts as required. It is used singly or collectively and has been used successfully to heat standard japanning ovens, lacquer ovens, drying boxes, etc. (See Fig 28)

A heater of tubular type for special application, used for various purposes, furnished in 1¼ or 2-in diameter and 300 to 600 watt per linear foot, used by Colliers Weekly, Doubleday, Page & Company, and various manufacturers of celluloid and leather goods.

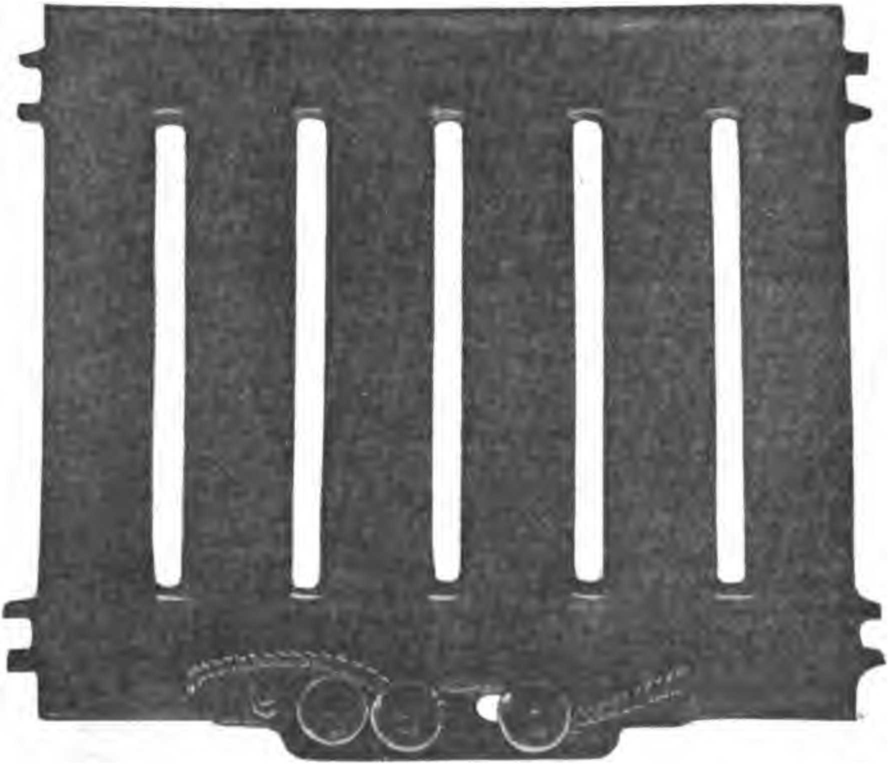


FIG 28—SPECIAL HEATER

Special Engraver's Stoves Stoves equipped for three-heat service and used to heat the engraved plates (from which all Government paper currency is printed) during the process of inking the plate. Six hundred of these stoves are in successful operation in the Government Printing Bureau at Washington.

Special Linotype Pots Fifty-six electrically heated pots installed in the printing department of the New York World. These pots are guaranteed to operate on an average current consumption of 550 watt per hr, maintaining a temperature control of 25 deg fahr. range.

Special Sleeve Ironer This is for use in laundries; various lengths or sizes, and current capacity according to requirements.

Special Flat-Iron Thirty-six are now in use in New York by a brush manufacturer for turning bristles and vulcanizing the rubber sheets that hold the bristles, 325-watt capacity.

Laboratory Stoves Special stoves used by United States Army Supply Department in New York for testing food products.

Embossing Machines A special heater with threaded end inserted into a small embossing machine. It is used to stamp the covers of small leather boxes.

Three-Kilowatt Radiators These are placed in zinc-lined boxes for drying special woods used by piano manufacturer, all moisture to be evaporated before the wood can be worked. The box is filled in the evening and the heater allowed to run all night to prepare the wood for use the next day.

Others are placed in zinc-lined boxes used for drying talcum powder cans and bottles preparatory to filling.

Five-Hundred-Watt Radiator This is placed in a metal box used for drying leather boxes and traveling bag parts that have been glued together.

Two-Kilowatt Radiator This is used to remove moisture in photogravure work.

Three-Kilowatt Radiator This is placed on a rack underneath the ink pad of a printing press for keeping the printing ink in a fluid condition.

This is installed with a 12-in fan blowing a continuous stream of hot air on drying racks for film development.

Sixteen-Hundred-Watt Disc-Stove This has a surface temperature of 1000 deg fahr., and is used for testing liquids in laboratory work.

Special Heater This was made for special type of melting pot and printing press used in making weather charts for the United States Government.

Disc Stove This is used by chemists for heating solutions to the right temperature before mixing.

Six-Pound Flat-Iron This is used by a photographer for drying prints, drying tissue and smoothing out mounts.

Hair Dryer This is used by a photographer also for drying negatives, prints and plates rapidly.

Toaster and Eight-Inch Fan A photographer wishing to increase the speed of drying photographs and to continue the use of a small tin, oven-type closet for the purpose, had a radiant toaster placed beneath the tin closet and an 8-in fan used in such a position as to blow the heat directly into the closet. The time was formerly 8 minutes; now 3 minutes.

Standard Devices for Photographic Developing Baths The water from the city pipes being too cold for the developing bath, it was necessary to raise the temperature from 10 to 30 degrees in the various baths. A number of heaters were used, such as an immersion coil, a foot warmer and small radiators, according to the condition and type of bath employed. The result was perfectly satisfactory.

A FEW RECENTLY DEVELOPED INDUSTRIAL APPLIANCES

Soldering and Branding Irons Experiments are being conducted which will probably result in irons of greater capacity and longer life. The length of life of the soldering iron is particularly effected by its continuous use, and this problem the manufacturers are endeavoring to solve. One of the great difficulties encountered by manufacturers is the variation in pressure of the current furnished by central stations, since heating devices are much more apt to suffer than are motors, meters, transformers, etc., when subjected to excessive voltage conditions.

Collar and Cuff Moulding Machine These machines for use by shirt manufacturers are equipped with automatically controlled heating elements.

Industrial Furnaces Considerable work has been done on large industrial furnaces and successful installation of furnaces with a capacity of from 20 to 35 kilowatts with a muffle of 6 by 2 by 1 foot in size are now in operation. Small muffle furnaces are also in operation and further improvements now being made indicate that a complete and practical line will be available within a very short time.

Leather Creasing Tool This is similar to a soldering tool except in tip and handle, and rules parallel lines for edge finishing and also for branding designs. Its advantages are, rapidity, convenience and cleanliness.

Serial Number Brander A brander like a soldering tool. The tip is furnished with a circular plate around the periphery, containing ⅜ inch figures from 0 to 9 which will brand any number. The company name may be included on the tip. It is used by tire manufacturers, repair shops, etc., and by central stations for placing names, number or dates on linemen's gloves.

Electric Brander This is used by meat packers for inspection stamps in place of rubber stamps and ink, easily obliterated. The electric branding is legible at the end of the curing process.

Photogravure Heater This is used in place of steam to eliminate dampness which causes serious loss by destroying prints; usually of 2-kw capacity.

Printing Ink Heater A special radiator for keeping printing ink warm and fluid; usually of 3-kw capacity. It is placed beneath the ink pad.

Type Melting Pot A special heater for printing press work, at present used in making of weather charts for the United States Government. Other uses are suggested.

Printing Press Heater This keeps postage stamps and other printed stickers dry during the process of printing before the adhesive moisture is put on the back. It is used in the Government Printing Bureau at Washington. (See Fig 28-A)

Special Box Mould Heater Used for shaping candy boxes, etc. The 1800-watt heater is installed inside the mould head, replacing steam, giving quicker action and a more regular temperature.

Gold Leaf Stamp Heaters These small heaters of about 100-watts replace gas for stamping gold leaf on neckwear, pipes and combs.

Button Die Heater Used in the manufacture of celluloid buttons; 60 to 150 watts with rheostat to regulate temperature. It is usually mounted on a bed-plate to heat the mould. (See Fig 29)

Electrotypers' Wax Melting Tool This has a polished bronze tip, sharp pointed for delicate work.

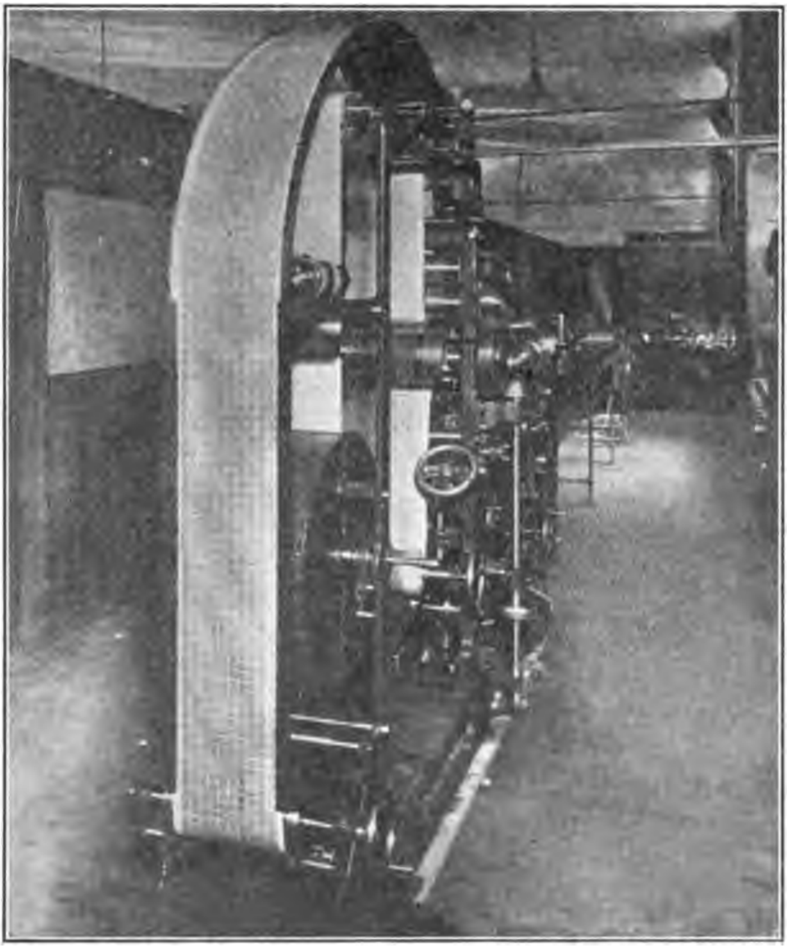


FIG 28A—PRESS HEATER

Perforator for Art Drawing The perforator runs over the lines of a drawing making minute perforations; the pattern is then used as a stencil with charcoal dust. (See Fig 30)

Horn Signal An electrically operated, sound signalling device for towns, factories, mines, ranches, etc.

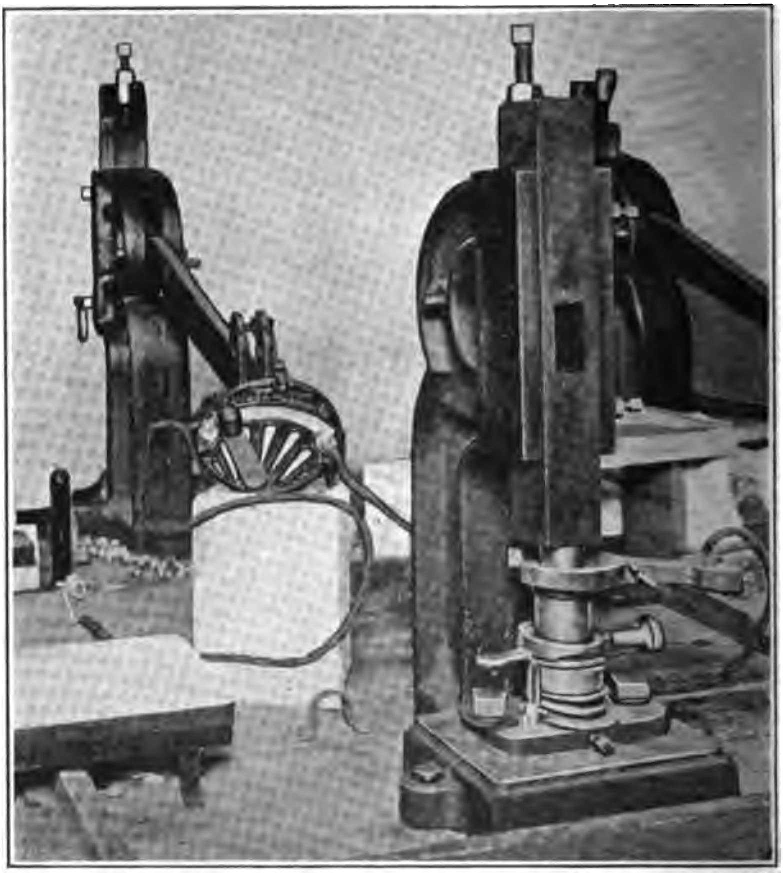


FIG 29—BUTTON DIE HEATER

Candy Maker An electrically heated, electrically operated machine for the manufacture of cream wafers and other cream candies. It is perhaps more of an adaptation than a development. (See Fig 31)

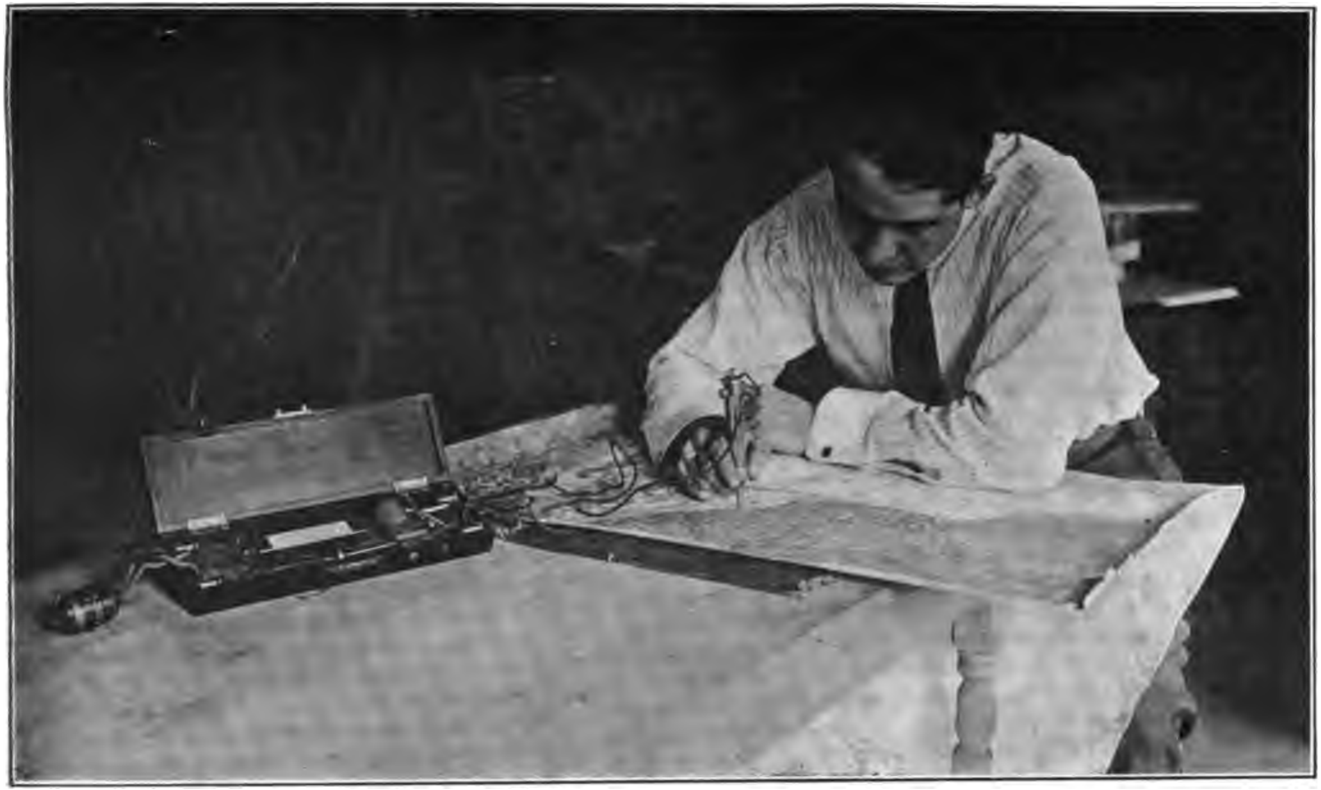


Fig 30—Perforator

Water Sterilizer An ultra-violet ray sterilizer for water; no chemicals, no heat, capacity from 20 to 5000 gal per hr, wattage from ¼ to ¾ kw. This is an extremely interesting and effective installation.

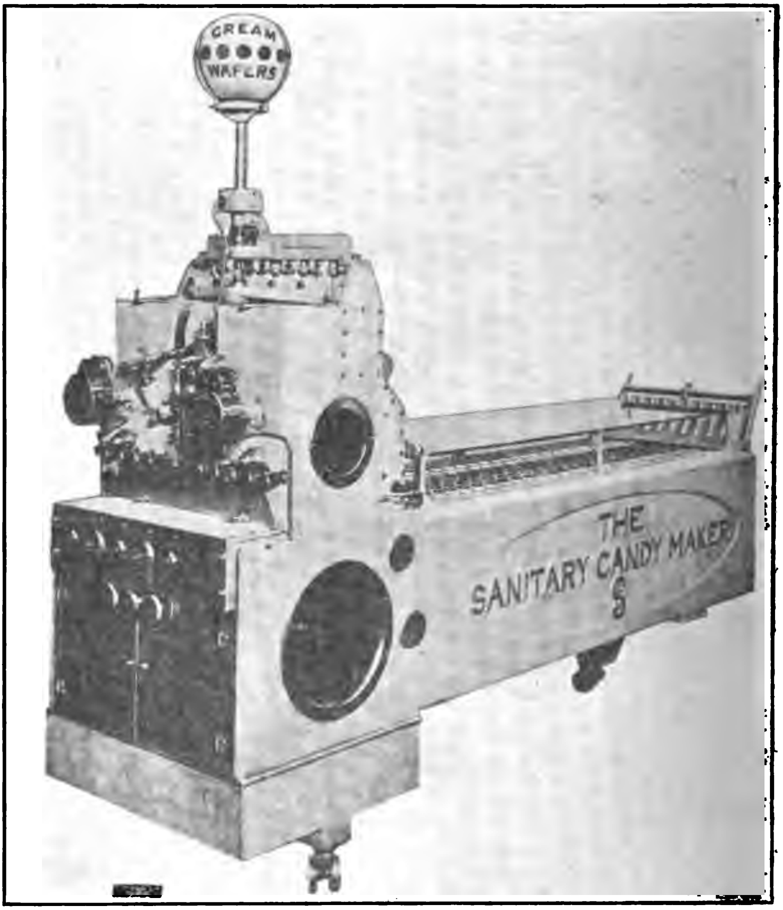


FIG 31—CANDY MAKER

Laundry Marking Machine In use for marking shirts and collars in laundries. (See Fig 32)

Wire Stitcher A new device used in industries when materials are sewed with wire. (See Fig 33)

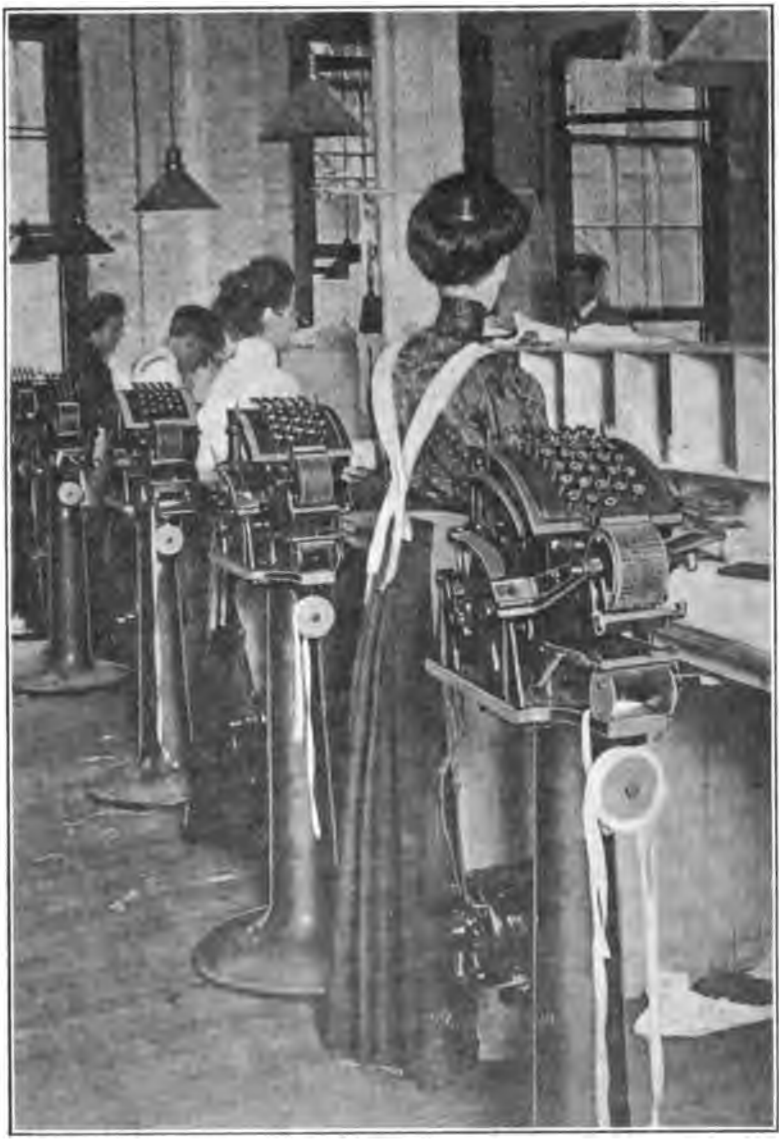


FIG 32—LAUNDRY MARKER

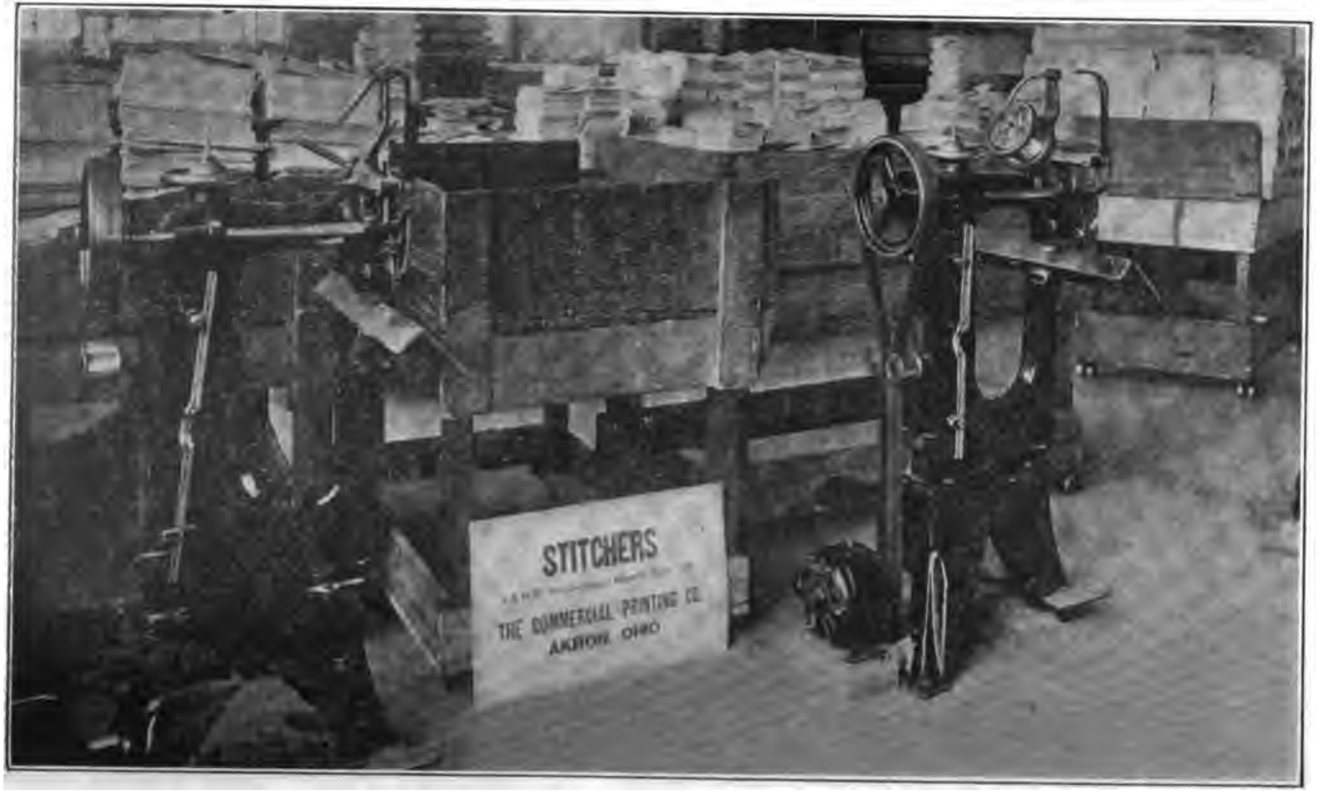


Fig 33—Wire Stitchers

Coin Counting Machines These machines take a quantity of coins, sort them into proper denominations, count and then wrap them in packages of given denominations, throwing out slugs and defective coins.

Soldering Machine for Jewelry Manufacturers This is a chain soldering machine operating at a working current of 6 kilowatts; capacity 25 000 feet of chain per day.

RECENT DEVELOPMENT IN OTHER ELECTRICAL APPLIANCES

Scope of Committee's Investigation The following pages lay particular emphasis on the development of household appliances. The division of the Committee's work was as follows:

(a) First, to ascertain from as many central stations and other distributors of electrical appliances as possible, the needs of their business, expressed in definite statements as to the appliances for which they found the greatest demand among their customers, together with some description of the appliances for which they, themselves, had discovered a use during the natural progress of their business, and

(b) To ascertain from the manufacturers of electrical appliances and supplies, how far they had already gone towards meeting the required development suggested by the first part of this investigation, and how far they might be able to meet this practically and economically in the future, realizing that the economical part of their problem would depend largely upon the volume of sales they might expect.

Central-Station Requirements (a) In writing to the central stations the Committee tried to keep in mind the deluge of questions which are asked of central stations in the course of a year by all the various committees of the different associations, and to be as brief and specific as possible in order to obtain definite replies. The question was as follows: "Will you state frankly what appliances you feel ought to be either developed or improved in order to perform functions which will help to solve the problems of the householder and the manufacturer, whom we all wish to encourage in the use of electricity?"

The Committee not unnaturally assumed that every central station had had a definite demand for some article not manufactured, or, at least, not known to the trade, and that the question could be easily answered from the information in the mind of any commercial employee of a central station. The Committee was not only disappointed but astounded at the quality of the replies received. About 400 central stations were written to and 172 responded. This percentage is not at all bad, but out of the 172 replies received 105 contained no information of any value whatever, and only 37 gave any helpful suggestions for new developments.

The replies which contained information can be grouped as follows: Seven offered recommendations for lower rates, forty-seven recommendations for lower prices, ten listed new developments of which they had knowledge, twenty-six offered suggestions for standardizing cords, plugs and receptacles (which suggestions have been referred to the proper committee of the National Electric Light Association for action) and five offered criticisms of the advertising supplied by manufacturers.

(b) From the information contained in the list of responsive members and from the combined experiences of the Committee as a whole, a letter was finally compiled to the manufacturers giving them the following information:

"The Committee finds a wide and insistent demand for a general reduction of prices qualified by the request that the manufacturers so arrange their list prices that a reasonable discount may be given to permit the central stations to conduct the merchandising business profitably. The central stations request that additional development be immediately produced in

Domestic ranges
Branding irons
Washing machines (for set tubs)
Dish-washers (household size)
Refrigerating equipment (household size)
Brooders
Section immersion coils
Garage radiators
Lamp-socket radiators
Hot-plates
Circulating water-heaters
Towel or hand driers

"There is also a widespread request for greater efficiency in

Dish-washers
Household refrigerating equipments
Hand driers
Broilers
Air-heaters

"The articles for which there is a specific demand at a stated price are as follows:

Domestic ranges	To retail at from $30 to $50
" washing machines	" " " " 30 " 75
" " " (for set tubs)	" " " " 30 " 50
Dish washers	" " " " 30 " 50
Refrigerating equipments (household)	" " " " 100 or less"

This letter was sent to all the manufacturers available because the Committee, while realizing that none of the people to whom the letter was addressed would be interested in or able to supply information upon all of the articles mentioned, found it impossible to judge from exactly what source the most helpful information might come.

This letter to manufacturers was not as broad in outline or as specific in detail as the Committee had hoped it would be, because of the lack of information from the central stations. Only rarely did a central station ask for the improvement of a particular appliance in some stated direction, and it was therefore thought better to ask of the manufacturers general information in regard to what improvements could be made in the manufacture and in the price of the appliances listed.

Price versus Quality It is extremely difficult to mention specific prices in a report of this type without being unfair either to the customer or to the manufacturer, yet it has been found impossible to tell the truth, the whole truth and nothing but the truth without referring at various points to specific prices. The Committee, however, wishes to place on record its appreciation of the fact that many elements enter into the question of the price of a given article.

The Committee wishes to confirm and emphasize the statement made in the Report of 1914 that "the sale of appliances at a fair merchandising profit is recommended as a uniform policy." Manufacturers who are obliged to satisfy the demands of dealers in a country of such great extent as this have many problems to meet. Some manufacturers have established a number of "f. o. b. points." Still the distance from the nearest of these to the dealer must, of necessity, govern the cost of the article to him.

There are certain manufacturers who, believing that there will always be a demand for an article of unusually high grade, even at a price greater than is asked for similar devices, are not willing to cheapen the manufacture of the article for the sake of competing; while, on the other hand, certain other manufacturers are aiming to produce a reasonably satisfactory article at a price which will permit of widespread distribution, believing that their profits lie in large sales and small margins rather than in restricted sales at a proportionately high rate of profit. It is possible to strain both methods and it is admittedly as bad for the development of business to have on the market an article so cheaply made as to fail to give lasting service as it is to fix a price for the article so high as to restrict its sale.

Household Appliances The Committee realizes the difficulty of condensing into this form the expressed statements and opinions of all the manufacturers who responded with information, and trusts that it has been able to do justice to the time and care expended by them on the letters received.

Irons and Ironing Machines The indicated development in hand irons is toward a further reduction in the retail price, and the introduction of thermostatic control particularly in the case of tailor's irons, but rapidly developing in the direction of household irons. The problem of thermostatic control has received the attention of most of the iron manufacturers, and at least one excellent example has been produced in the past year. It may be said that while the manufacturers and the central stations are ready for this development the public has hardly been educated to the technical use of the article, although the demand for the result obtained actually exists.

This problem has been met part way by the production of an automatic regulator stand, by a 3-heat control on the iron itself, and by a hand-controlled stand. The difficulty with all hand-controlled operation is that since the iron must be kept at least warm between one time of use and another, the operator leaves the heat on in the case of the single heat, and at the high heat in the case of 3-heat hand control. The main advantage of a 3-heat control is apparently for firms that iron practically all one day on one class of work and all the next day on another class.

The main improvement in all types of irons during the year has been in the heating unit in the direction of more satisfactory life and service. There seems to be considerable difference of opinion as to whether an iron should be equipped with a permanently connected or a separable plug. The latter has one advantage which seems to outweigh most of the advantages of the other type. Nearly all iron repairs are from cord trouble, and with the separable connector the customer is not required to bring in the whole iron in order to have repairs made to the cord.

The standard price for the 6-pound household iron to-day, practically throughout the country, is $3.50. It is apparent that during 1915 a 6-pound household iron will be developed which can be retailed at $2.50 with a margin of profit sufficient to warrant any dealer, whether a central station or not, in carrying it. It is believed that the introduction of the $2.50 iron will open a tremendous field which we have never been able to reach with the $3.50 iron, although the Committee believes that the sale of the latter iron will continue in perhaps reduced volume, just as the $4.00 iron has continued to sell since the introduction of the $3.50 iron.

Household ironing machines operated by electricity and heated by either gas or electricity are becoming more and more popular, and the year has seen the development. Experience with the electrically heated machine intelligently operated seems to prove that the ironing machine electrically heated and operated will be sold in increasing volume during the coming year, although at the present time there is no indication of any reduction in price, present prices ranging in the neighborhood of $100 which is a considerable investment for the average householder, and does not compare favorably with the continued reductions in vacuum cleaners and washing-machines.

Domestic Ranges In no single article has there been such rapidly increasing interest shown as in the domestic range. Sales are increasing in nearly every part of the country, and while the changes in construction have been minor during the year, they have occurred so rapidly as to lead to the belief that still greater improvement will be shown during the coming months. The tendency is toward simplicity of construction, but unfortunately it has seemed to be necessary to start at the point where the gas range manufacturers began instead of at the point where they left off.

The average householder has become so used to a cabinet range that he looks with extreme disfavor on any range with an underneath oven, and yet this latter type is the only one that has been produced by the larger manufacturers at anything like a reasonable price. The manufacturer claims that until such time as the central stations agree on the type of range they desire, it will be impossible to meet their demands. If the central stations demand a range with very low wattage consumption, the manufacturer must furnish a high efficiency range which it is apparently impossible to manufacture at low cost, as it involves the use of expensive insulating materials and special heat-resistance metals. The indicated development is in the direction of a lower peak demand, obtained, for instance, by a switch which will not permit two principal units to be operated at once, and in greater reliability in the heating units.

The principal difference of opinion seems to be over the use of radiant and non-radiant heating units. The ranges using radiant heating units sell for comparatively low prices. Mention may be made of ranges represented to take care of the cooking requirements of a family of four or five and costing central stations from $28 to $35 each, while the ranges of the non-radiant type do not run even as low as $50.

There is encouragement in the fact that the prices of electric ranges have been reduced about 50 per cent within the last five years. As the output increases a still further reduction will undoubtedly be effected. In spite of the difficulty which the manufacturer finds in producing a range with low-wattage demand at a reasonable price, the Committee believes it a mistake to advocate ranges with a high-wattage demand, since the purchase price of a range is eventually forgotten while the monthly bill comes in regularly.

There seems to have been little development in the cooker during the past year, possibly because the demand has not proved inspiring, yet the electric fireless cooker may easily claim superiority over every other form of fireless cooker. It is notable that even in cities served by a steam station, and where cheap hydraulic power is not obtainable, some central stations have been able to offer a rate which has resulted in the installation of a number of electric equipments in large sizes for hotel and club use.

Toasters, Toaster Stoves and Grills There has been a considerable improvement in toasters during the past year and a drop in retail price from $5 to $3.50. Their sale has largely increased. The reduction in price is a healthy sign, but it is unfortunate that the $2.50 toaster should have been brought out, since the public will be inclined to expect as much of it as of the $3.50 type.

The popularity of the grill is steadily increasing in spite of the statement made by some manufacturers that it is not a practical article. The increased sale of grills has materially affected the rate of increase of the toasters, many people preferring to combine the two articles in one, although a grill is uneconomical if used to toast. One distinctly new development of grill has included the abandonment of the nickel finish. According to some manufacturers the nickel and polished finishes are to blame for a large part of the high cost of manufacture, and if the public is willing to accept a cheaper finish, a reduction in price may be obtained. The Committee is not, at this time, prepared to say what the attitude of the public is going to be in regard to a black finish, or any cheaper finish than they have been using in the past. Experience will teach the value of this.

Circulation Water Heaters This apparatus is inextricably bound up with the future development of the domestic range. Without a circulating water-heater which will take the place of the water-back in the coal range or the gas attachment in the gas range, it is extremely difficult to persuade a householder to change his method of cooking. There is now on the market a low-priced circulating water-heater in capacity from 1 to 2 kilowatts, which is being used satisfactorily by householders. Improvement is constantly being made in the life of the units of this heater and it is possible that the solution of the problem of water-heating is not far off.

Percolators, Samovars, Chafing Dishes, etc The improvement in household hollow-ware has been in three directions, in the quality of the heating elements, in artistic design and in reduction of price. This year has seen the introduction of a $5 percolator which is going to be enormously helpful in popularizing the article. It is not believed that the price will be reduced much below this point for some time, but that the $10, $12 and $15 percolators will be cheapened. The percolator may now be accepted as a standard article.

The past year has seen an immense increase in the popularity of the samovar or tea-kettle which is now likely to rank with the electric percolator as the alcohol teapot does with the alcohol percolator.

The $10 chafing dish has arrived and we may look forward with confidence to a $7.50 chafing dish in the future.

The trend of this end of the business appears to be to regard the manufacture of these articles as a hollow-ware rather than an electric problem, the hollow-ware manufacturers electrifying their products rather than the electric manufacturers purchasing hollow-ware for electrification.

Hot-Plates It has been difficult to dislodge the popular gas hot-plate from the average household, but it is expected that within the next four or five months, hot-plates of greater capacity and reliability will enable us to more nearly compete with gas.

Radiators The fixed law of B. t. u.'s interferes unfortunately with the more rapid development of radiators which, in the opinion of some manufacturers, have already reached 100 per cent efficiency. We now have, however, three or four makes of small 600-watt radiators which retail for approximately $5 and are meeting with great favor among the householders for secondary heating. Primary heating remains comparatively expensive.

There has been an insistent demand during the year for some form of garage heater which has developed a type of radiator to be inserted under the hood of the engine for the purpose of keeping the water warm. The old method was to place a 400 or 500-watt radiator under the engine and retain more or less of the heat by means of a dust sheet thrown over the entire car. This was not particularly efficient and the radiator heater now used is made to consume as little as 180 watts and at the same time protect the car when the temperature of the garage is reasonably low. One type of radiator heater is operated in water which means frequent burn-outs from evaporation. The other type operates in the air without unreasonable loss of efficiency.

Vibrators, Hair-Driers, Curling Irons, etc There have been various improvements in these lines during the past year. The $10 vibrator is not quite as efficient as we had hoped, but those more expensive are apparently entirely satisfactory.

The difficulty of making a successful curling iron lies in the size and shape of the heating element, but this difficulty has apparently been overcome to a large extent in one case in an iron which retails at $3.50 and is giving excellent satisfaction, although it has not been long in use. Many people still prefer the curling iron heater, using their own iron.

Sewing Machine and Utility Motors A number of new motors have come on the market this year, the sewing machine motor retailing as low as $14 and the utility motor at $8.50, the latter with, of course, very light power. Sewing machine motors are difficult to sell and have not as wide a distribution as they ought to have, the selling problem being not yet solved.

Vacuum Cleaners It has been the custom to recommend a vacuum cleaner which sold at $85 to $125, but during the past year a tremendous development has occurred in those selling for $25 to $50, which cleaners are entirely efficient and satisfactory for use in households where there are not a large number of heavy draperies, thick-pile rugs and carpets. The more expensive type of cleaner now finds its principal sale among theatres, public buildings and the like.

The next development, already in sight, is a vacuum cleaner of nearly as great efficiency as the $25 type, to retail at $18, and it is believed that a satisfactory cleaner at this price will find a very large market.

Perhaps the greatest advance in the sale of vacuum cleaners is the elimination or reduction of the trial period, many dealers now giving no trial whatever except the demonstration made by the salesman in the presence of the customer.

Clothes Washing Machines The principal development in this field, aside from minor improvements in special makes, is a reduction in price, the tendency being toward a machine to sell for $75 which originally cost $100. This will doubtless help the sale, and is approaching the $50 machine devised by the central station. Some manufacturers claim that lower-priced machines, those at $30, do not sell as readily as $50 machines, since while the $50 machine is usually a wooden-tub machine, people prefer to put a little more money into the device and get a metal body machine, now retailing at $75 to $110.

The extremely interesting thing in this connection is the demand for a clothes-washing machine that shall be tubless and rest on the ordinary set tubs in kitchen or laundry. For a reason not at all clear to the Committee, this type of machine appears to cost a great deal more than the tub type. While it possesses advantages in the matter of size, it is unfortunate that a machine cannot be devised that will compare favorably with the tub-type machine less the price of the tub.

We have the statement of manufacturers that these machines must be of very high grade in order to give continued satisfaction, and that a price averaging around $100 is indicated by other classes of manufacture.

A small-sized machine of the rotating cylinder type has just been completed and placed on the market, which will retail at $60.

Dish-Washing Machines This is an article which has long been demanded by the general public and the solution is now approaching in a perfectly efficient machine which retails for $65. There are other types running as high as $110 to $125, but there are several types at $65, and this is the popular price at the moment. It should be noted that, as is the case with all motor-driven devices, the satisfaction in the use of the article depends to a large extent on the type of motor used. A motor which requires a very high starting load is to be avoided as it is liable to cause trouble not only by "jumping the lights," etc., but by being of too great amperage for a lamp socket.

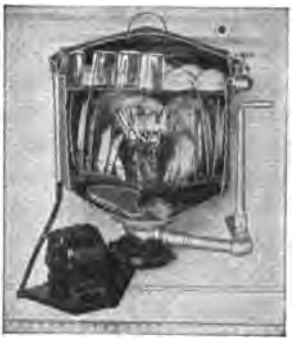


FIG 34—DISH WASHING MACHINE

Motor-driven dish washers have been developed for domestic use that are reasonably priced, of low wattage, are practical and will not break glassware. The water heater is not included. (See Fig 34)

Towel Driers Towel driers are used principally in large residences. They consist of well insulated boxes ventilated to take air moisture and are used only one-half to one hour after each large meal. (See Fig 35)

Domestic Refrigeration This is a development which has received careful attention on the part of both central stations and manufacturers. Formerly the cheapest refrigerating plant that could be secured for the average household represented a total investment including wiring of $1,100 to $1,200, whereas now our attention is called to an installation which will cost from $250 to $300. It is, of course, desirable to secure an installation at a total cost, the interest charges upon which will not exceed the annual expenditure for ordinary ice, leaving out of consideration the cost of operation and maintenance of the machine itself. It is a difficult problem but is being solved. Samples have been furnished by several refrigerating companies, descriptions of the

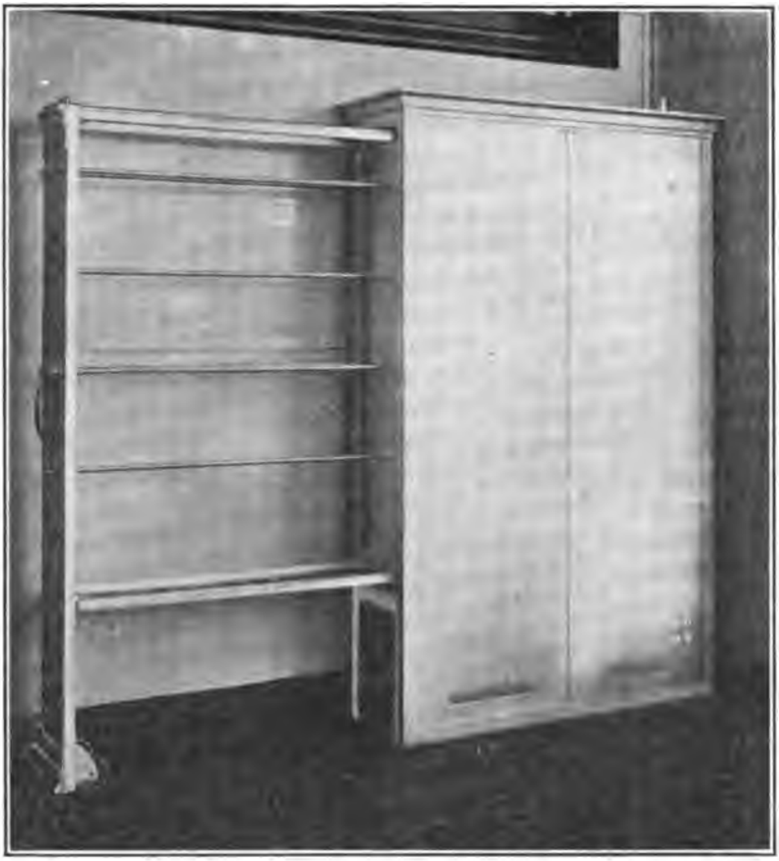


FIG 35—TOWEL DRIER

types furnished by two being as follows: First manufacturer—Type A, ⅛-hp motor, intended for refrigerator having an inside cubic area of 10 cu-ft or less; capacity equal to melting 50 to 75 pounds of ice per day.

Type B, ¼-hp motor, intended for refrigerator having an inside cubic area of over 10 and under 20 feet, capacity equal to melting 100 pounds of ice per day.

Type C, ½-hp motor, intended for refrigerator having an inside cubic area of 60 to 70 cu-ft, capacity equal to melting 300 pounds of ice per day.

The most practical type of this machine for average household use is Type B, owing to its capacity for making ice and economy of operation.

Second manufacturer—Type A, ¼-hp motor, intended for refrigerator having an inside cubic area of 35 cu-ft or less.

Type B, ½-hp motor, intended for refrigerator having an inside cubic area of 40 to 75 cu-ft.

Therapeutics Beginning with heating pads and running on through an astounding number of devices, electricity is being adopted by the medical profession for many uses. Thus far this phase of the business has been left pretty much alone by central stations with one or two notable exceptions, principally because of the responsibility involved, but no report will be complete without calling attention to this wide use of electric current.

APPLIANCE STOCK ROUTINE

The following description is that of the stock routine operated by one company. This company has a chain of seventeen stores, but the same method may be applied to companies having but one store or showroom, as the most valuable feature of this system is the reliable check on all material in stock, regardless of its location, whether in the showroom, stockroom, repair department or loaned out. The exact location of the material, its cost, selling price and serial number are available at a glance, the triplicate form known as "Stock Requisition" (Fig 36) providing all necessary records for quick reference.

The division of work in connection with handling electrical appliances, according to this routine, is as follows:

The Appliance Department is maintained in the general office building of the company and acts as the receiving and distributing stock agent for a chain of seventeen stores. This department supervises all dealings with customers throughout the territory served by the seventeen stores in as many cities and towns located within twenty-five miles of the general office.

The Supply Department requisitions, receives, inspects, handles and ships all goods, keeps a card ledger of all stock movements and controls the quantities carried between limits set by the Appliance Department, acknowledges for the receipt of goods, for the payment of bills and handles all repairs and claims.

The Purchasing Department completes the purchases and audits all bills in accordance with acknowledgments sent from the Supply Department and the terms of vendors' orders.

The initial operation designated "the authorization" originates in the Appliance Department and takes the form of either a special authorization (providing for the purchase of a definite number of articles) or a standard authorization (providing for an indefinite quantity with a current stock to be maintained between maximum and minimum limits).

On receipt of an authorization by the Supply Department, a requisition is drawn which in the case of a special authorization is a temporary requisition and answers for one purchase only. In the case of a standard authorization a permanent requisition is drawn which is used for a maximum of fifteen purchases. The function of the requisition is to request the Purchasing Department to get prices and terms from the vendor. It is later used by the Fisher billing machine operators as copy for the vendor's order.

At the time the order is drawn, as noted above, a voucher known as an acknowledgment is made in two copies which serve as evidence to the Purchasing Department and the Accounting Department that goods have been received and are satisfactory. In case the goods are not so, or are not as billed, a claim is made at the time of their receipt.

Accompanying the vendor's order and the acknowledgment is the stock requisition (in three copies) which serve, one as a label to be placed on the goods while in stock, another as the identification slip to be placed inside the package in case goods are returned after purchase, and, the third, as a requisition for taking the goods out of stock and allowing the proper entries to be made in the Accounting Department's books, and as a receipt to remain with the Supply Department as evidence that the stock has been delivered.

For each article purchased there is one set of these triplicate forms employed, each form (of three copies) bearing a serial number. This number appears on all entries concerning the item for which the form has been used wherever such entries are necessary throughout the system.

METHOD OF USING TRIPLICATE FORM

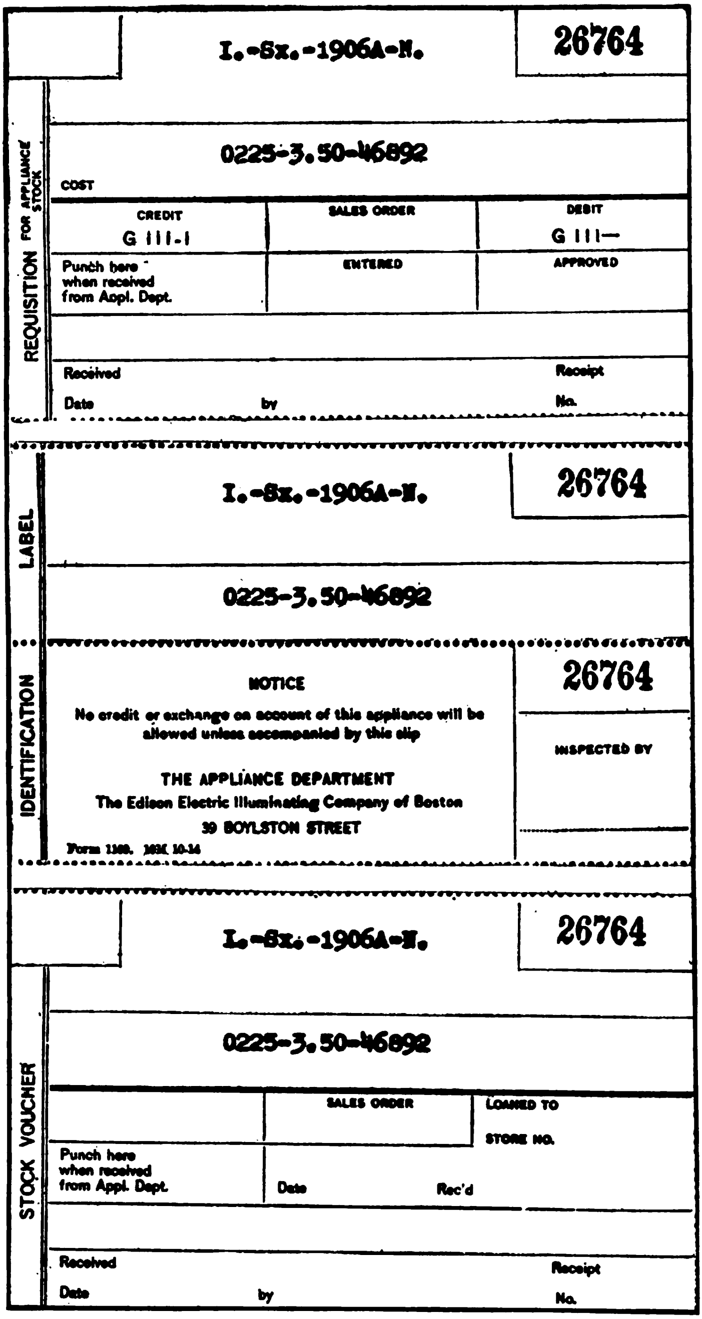
As all material is received at one stockroom for ultimate distribution to the seventeen stores, for each item purchased the Supply Department employs the use of one set of triplicate forms and one copy of the vendor's order to identify and assort the material.

The triplicate, or card copy, is handed to the Appliance Department stock dispatcher, where it is filed as evidence of material in stock. When the material is sold this card is removed from file and forwarded with the debit sales order (Fig 37) to the Stockroom for shipment or passed over the counter to the purchaser. This card is signed by the person receiving the material and thus clears the Supply Department from further responsibility for the material. This form is then sent to the stock ledger account, item deducted, prices verified and then forwarded to the Accounting Department for entry on the books, charging the proper Appliance Department account and crediting the proper Supply Department account.

The duplicate acts both as label and identification slip by tearing through the perforated center, the first part being pasted on the package as a label and the second part put inside the package for future identification.

The original acts as a receipt and remains with the Supply Department permanently as evidence that the material is either on the shelf (in which case this copy is filed in the active file) or given out for sale or loan (in which case this copy is filed in the inactive file).

All three copies show a symbolized form of the name and make of the article, the cost price and selling price (in code)



REQUISITION FOR APPLIANCE STOCK

I.-Sx.-1906A-N. 26764

0225-3.50-46892

COST

CREDIT	SALES ORDER	DEBIT
G 111-1		G 111—
Punch here when received from Appl. Dept.	ENTERED	APPROVED

Received Date by Receipt No.

LABEL

I.-Sx.-1906A-N. 26764

0225-3.50-46892

IDENTIFICATION

NOTICE

No credit or exchange on account of this appliance will be allowed unless accompanied by this slip

THE APPLIANCE DEPARTMENT
The Edison Electric Illuminating Company of Boston
39 BOYLSTON STREET

Form 1160. 10M 10-14

26764

INSPECTED BY

STOCK VOUCHER

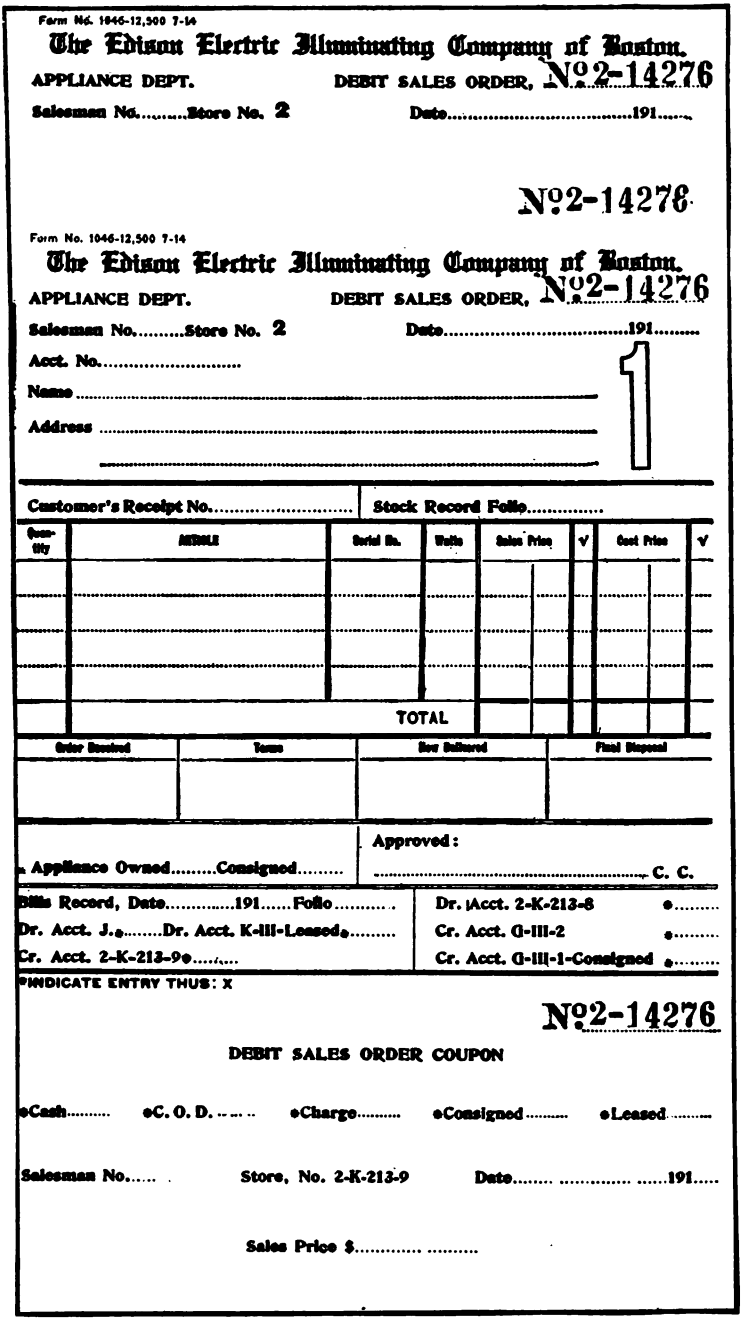
I.-Sx.-1906A-N. 26764

0225-3.50-46892

	SALES ORDER	LOANED TO STORE NO.
Punch here when received from Appl. Dept.	Date Rec'd	

Received Date by Receipt No.

FIG 36—STOCK REQUISITION (3 IN BY 5 IN)



Form No. 1046-12,500 7-14

The Edison Electric Illuminating Company of Boston.

APPLIANCE DEPT. DEBIT SALES ORDER, №2-14276

Salesman No.......... Store No. 2 Date..................................191.......

№2-14276

Form No. 1046-12,500 7-14

The Edison Electric Illuminating Company of Boston.

APPLIANCE DEPT. DEBIT SALES ORDER, №2-14276

Salesman No.......... Store No. 2 Date..................................191.........

1

Acct. No...........................

Name ....

Address ....

Customer's Receipt No.......................... Stock Record Folio..............

Quantity	ARTICLE	Serial No.	Watts	Sales Price	√	Cost Price	√
	TOTAL						

Order Received	Terms	How Delivered	Final Disposal

Appliance Owned.........Consigned.........

Approved:

.... C. C.

Bills Record, Date..............191......Folio...........

Dr. Acct. J.*........Dr. Acct. K-III-Leased*.........

Cr. Acct. 2-K-213-9*.........

Dr. Acct. 2-K-213-8 *.........

Cr. Acct. G-III-2 *.........

Cr. Acct. G-III-1-Consigned *.........

*INDICATE ENTRY THUS: X

№2-14276

DEBIT SALES ORDER COUPON

*Cash......... *C. O. D. .... *Charge......... *Consigned......... *Leased.........

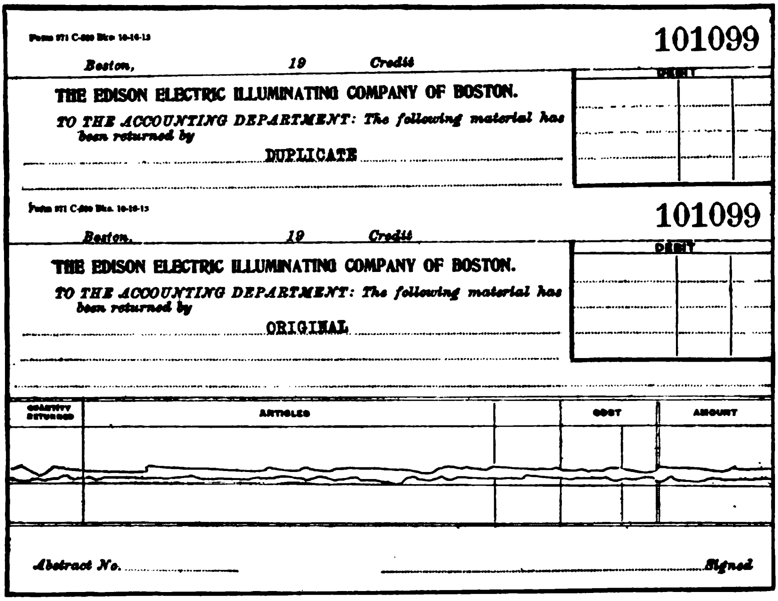
Salesman No...... Store, No. 2-K-213-9 Date........................191.....

Sales Price $.......................

Fig 37—Debit Sales Order

and the vendor's order number. In case of material credited into stock, the credit requisition number appears in place of the vendor's order number.

Stock to the amount of $300 to $1,000 is carried in each of the suburban stores on loan from the general office, the evidence of which is indicated in the Supply Department by means of an exchange of the (form) Stock Voucher and (form) Stock Requisition. This routine eliminates bookkeeping entries and protects the Supply Department by substituting for the material loaned the Stock Requisition which, in case the material thus loaned is not produced on inventory, may be forwarded to the Accounting Department as a credit and protection to the Supply Department.



101099

Boston, 19 *Credit*

DEBIT

THE EDISON ELECTRIC ILLUMINATING COMPANY OF BOSTON.

TO THE ACCOUNTING DEPARTMENT: The following material has been returned by

DUPLICATE

101099

Boston, 19 *Credit*

DEBIT

THE EDISON ELECTRIC ILLUMINATING COMPANY OF BOSTON.

TO THE ACCOUNTING DEPARTMENT: The following material has been returned by

ORIGINAL

QUANTITY RETURNED	ARTICLES		COST	AMOUNT

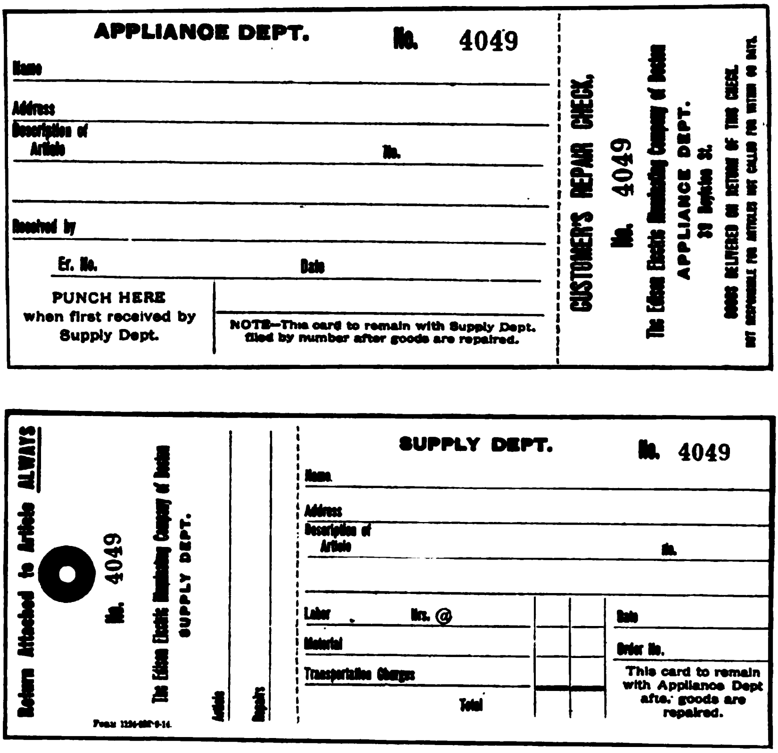
Abstract No. *Signed*

FIG 38—CREDIT REQUISITION

A serial number is used but once and becomes inactive when goods are withdrawn from stock. If material is returned it comes back into stock on a form known as Credit Requisition (Fig 38), bearing new numbers.

It is a rule of the department that all material when received for stock (except a quantity determined upon for local exhibit in the general office show-room) shall be packed and labeled for future shipment and taken out in sequence of serial numbers, thus providing an absolute rotation in stock.

Repairs are handled by doing the work in the Stockroom or returning the piece to the factory of the maker. Articles brought in by customers and any articles to be sent to the factory follow the repair routine in the following manner.



APPLIANCE DEPT. No. 4049

Name

Address

Description of Article No.

Received by

Er. No. Date

PUNCH HERE when first received by Supply Dept.

NOTE—This card to remain with Supply Dept. filed by number after goods are repaired.

CUSTOMER'S REPAIR CHECK.

No. 4049

The Edison Electric Illuminating Company of Boston

APPLIANCE DEPT.

39 Boylston St.

GOODS DELIVERED ON RETURN OF THIS CHECK.

NOT RESPONSIBLE FOR ARTICLES NOT CALLED FOR WITHIN 60 DAYS.

Return Attached to Article ALWAYS

No. 4049

The Edison Electric Illuminating Company of Boston

SUPPLY DEPT.

Form 1226-[illegible]-9-14.

Article

Repairs

SUPPLY DEPT. No. 4049

Name

Address

Description of Article No.

Labor Hrs. @

Material

Transportation Charges

Total

Date

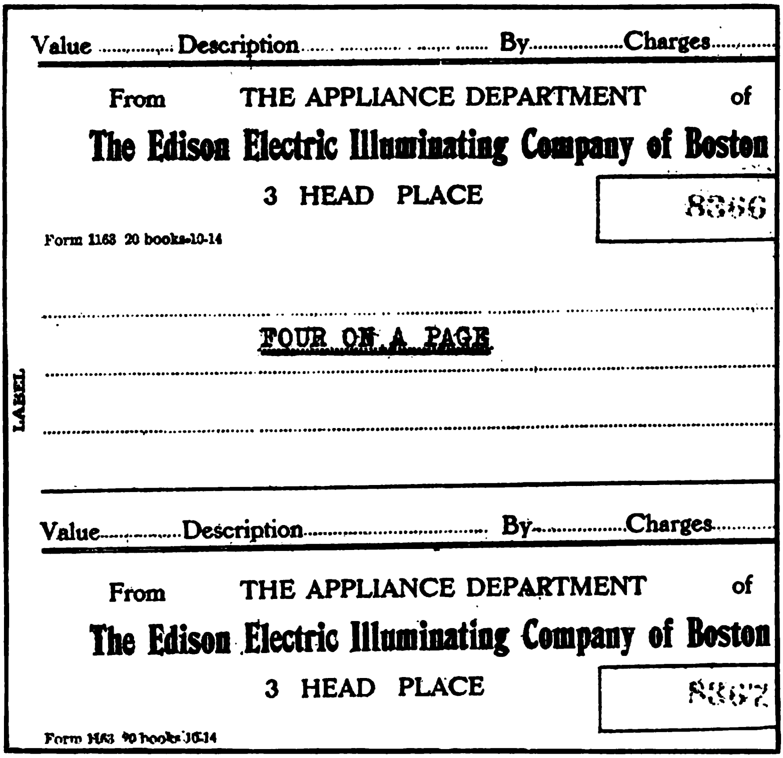
Order No.

This card to remain with Appliance Dept after goods are repaired.

FIG 39—REPAIR TAG

The repair tag (Fig 39) is attached to the article and one perforated stub is given to the customer, another is kept by the Appliance Department and the third filed with the Supply Department. The article itself is forwarded to the factory or repaired in the Stockroom with the original part of the tag attached, which portion of the tag bears a printed statement that this must be returned with the article.

When material is returned after repair has been made, the Supply and Appliance Departments exchange stubs, this routine clearing the Supply Department of responsibility as to repair, shipment, etc, and placing evidence with the Appliance Department that the material is in stock awaiting the customer's call or shipping directions. When finally sent out the receipt returned by the customer is filed by the Supply Department.



Value .... Description .... By .... Charges ....

From THE APPLIANCE DEPARTMENT of

The Edison Electric Illuminating Company of Boston

3 HEAD PLACE

8366

Form 1163 20 books-10-14

....

FOUR ON A PAGE

....

LABEL

....

Value .... Description .... By .... Charges ....

From THE APPLIANCE DEPARTMENT of

The Edison Electric Illuminating Company of Boston

3 HEAD PLACE

8367

Form 1163 20 books-10-14

Fig 40—Shipping Paster

On all shipments of any nature a triplicate shipping paster (Fig 40) is used, the original pasted on the package, the duplicate forwarded to the Transportation Department which Department pays expressage and collects c. o. d. charges, the triplicate remaining in the Supply Department as evidence of delivery, thus providing in the case of claim or non-delivery, a copy of the address and information listed on the original label pasted on the package. All connecting records concerning this shipment bear the shipping number listed on the paster used.

A recent audit of this system covering the chain of seventeen stores, revealed only two errors in the handling of 2000 electrical appliances of various types, and these errors were due to misfiling, no losses or discrepancies in the stock accounts having been found.

PERPETUAL INVENTORY SYSTEM

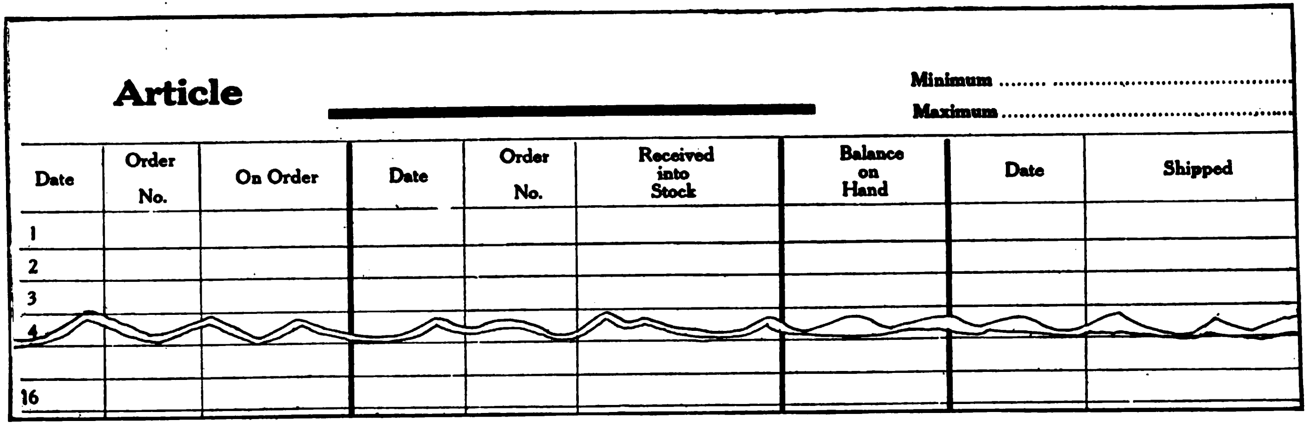
The stock is regulated entirely by maximums and minimums made up three months in advance on the basis of very carefully kept records of sales on each appliance for the same month of the preceding year. The demand for the year previous is increased or decreased a certain percentage, depending upon the sales effort and other conditions tending to create a demand, as nearly as these can be anticipated.

The stock is kept on a perpetual inventory plan, which operates about as follows: A card file is provided in which each item of stock is given a separate card (Fig 41) and the place provided at the top of the card will show the name of the item carried on that card, with the maximum and minimum.

Then the vertical columns of the card are marked for "date," "stock in," "stock out" and "total on hand." Each time an appliance is added to or taken from the stock, proper notation is made on this card, and in that way a definite idea can be gained of stock on hand at any time. These cards may be kept in a file or placed on a shelf beside the stock, as will best suit the individual requirements.

The minimum, which is the quantity on hand when an additional order must be placed, should be such an amount as to allow time for the order to reach the manufacturer and the material to get back to the purchaser before the stock can be entirely depleted under ordinary demands. When the minimum is reached a quantity equal to the difference between the minimum and the maximum is ordered, therefore the maximum should be any arbitrary quantity that will adjust the size of the order to meet conditions properly.

A monthly report is made up showing "dead stock" and "overstock," and the Sales Department held responsible for the disposal of this each month, with the privilege of offering a special discount if advisable.



Article

Minimum ....

Maximum ....

Date	Order No.	On Order	Date	Order No.	Received into Stock	Balance on Hand	Date	Shipped
1								
2								
3								
4								
16								

Fig 41—Stock Record Card

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How a woman consumer views some of the current advertising, Adv and Selling, Nov 1914, p 16
Appliances already on the lines, handled by house-to-house canvass. Card record kept of same
1057 elec irons in 1913, Harrisburg, Pa, Elec Mer, vol 65, p 79

2 THE FACTORS IN CREATING A DEMAND FOR HOUSEHOLD APPLIANCES

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Elec development society engages expert, Elec Rev, vol 64, p 1095
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Getting Christmas trade, Elec World, vol 63, p 44
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Women solicitors successful at Sheboygan, Wis, Elec Rev, vol 64, p 418

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Detroit, Elec World, vol 65, p 524
Elec kitchens in domestic service schools, Elec Rev, vol 65, p 615
Elec kitchen campaign in Kansas City, Elec Rev, vol 65, p 413
Flat irons, 2000 in four month—Boston, Elec Rev, vol 65, p 896
Flat irons, 125 in two weeks—Defiance, O, Elec Mer, vol 13, p 17
Washing machine campaign in Joliet, Ills—74 in 30 days, Elec Rev, vol 65, p 369
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Department stores, N E L A 32d conv, p 564

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Wash-day on the sidewalk, Elec Mer, vol 13, p 225
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Fort Wayne, Ind, Elec World, vol 64, p 524
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"Dad's day," float—Seattle, Elec Rev, vol 65, p 414
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Estimating costs of campaign and detailed follow-up work

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Plan for increasing the power load, N E L A, 35th conv, vol 2, p 330

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Use of information and soliciting file, N E L A, 37th conv, comml vol, p 33

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Renting vacuum cleaners, Denver, Elec Mer, vol 13, p 79

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MANAGEMENT

SCIENTIFIC MANAGEMENT

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BUSINESS MANAGEMENT

Jas B Griffith, American Accountants Library, Chicago, 2 vols

SCIENTIFIC MANAGEMENT

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COST KEEPING AND SCIENTIFIC MANAGEMENT

Holden A. Evans, McGraw-Hill Book Co, 1911, N Y

PRIMER OF SCIENTIFIC MANAGEMENT

F B Gilbreth, D VanNostrand Co, 1912, N Y

SCIENTIFIC SALES MANAGEMENT

Chas W Hoyt, G B Woolson & Co, 1913, New Haven, Conn

APPLIED METHODS OF SCIENTIFIC MANAGEMENT

F A Parkhurst, J Wiley & Sons, N Y, 1912

THE PRINCIPLES OF SCIENTIFIC MANAGEMENT

F Winslow Taylor, Harper & Bros, 1911, N Y

THE SCIENCE OF BUILDING ANY BUSINESS

A F Sheldon, proceedings British Commercial Gas Association, 1912, p 285-325

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L F Deland, 1909

PRINCIPLES OF SCIENTIFIC MANAGEMENT

F W Taylor, 1911

ADVERTISING

MODERN ADVERTISING

Calkins & Holden, 1907

THEORY OF ADVERTISING

W D Scott, 1912

PSYCHOLOGY OF ADVERTISING

W D Scott, 1912

HOW TO ADVERTISE A RETAIL STORE

A E Edgar, 1913

ADVERTISING AS A BUSINESS FORCE

Paul T Cherington, 1913

INFLUENCING MEN IN BUSINESS

W D Scott, 1911

THE PRINCIPLES OF ADVERTISING ARRANGEMENT

F A Parsons, 1912

SALESMANSHIP

STUDY OF THE PROBLEM OF DOMESTIC ECONOMY AS A FACTOR IN SALESMANSHIP

Proceeding, British Commercial Gas Association, 1913, p 107-139

COMMERCIAL CORRESPONDENCE, SALESMEN AND SALESMANSHIP

G W Poole, J J Buzzell, American Business Book Co, Boston, 1913

MEN WHO SELL THINGS

Walter D Moody, A C McClurz & Co, Chicago, 1912

SALESMANSHIP

A book on selling; numerous authors; Business Man's Library, vol 4; and vol 9, A W Shaw Co, 1913, N Y

HUMAN NATURE IN SELLING GOODS

Jas H Collins, H Altemus Co, 1909

THE PRINCIPLES OF SALESMANSHIP

Wm A Corbion, G W Jacobs & Co, Phila, 1907

PRACTICAL SALESMANSHIP

Nat C Fowler, Jr, Little-Brown Co, Boston, 1912

THE TRAINING OF NON-TECHNICAL MEN

C Dooley, American Inst of Electrical Engineering, vol 28 pt 2-p 1095-1102, June 28-July 1, 1909

THE TWELVE PRINCIPLES OF EFFICIENCY

Harrington Emerson, Engineering Magazine, New York, 1912

THE EFFICIENT MAN
Thos D West, 1914
EMPLOYER AND EMPLOYEE
Various authors; Business Man's Library, vol 8, A W Shaw Co, 1913
INCREASING HUMAN EFFICIENCY IN BUSINESS
W D Scott, 1911
GINGER TALKS
W C Holman, 1910
SELLING SUGGESTIONS
Frank Farrington, 1913
SALESMANSHIP FOR WOMEN
A Benedict-Roche, 1914

RETAIL SELLING

HOW TO INCREASE YOUR SALES
Pamphlet; The System Co, N Y and Chicago, 1910
ADVERTISING AND SELLING
H L Hollingworth, D Appleton & Co, New York, 1913
HOW TO SELL IT
Pamphlet; N Y Economist Training School, 1913
THE ART OF SELLING
A F Sheldon, Libertyville, Ill, 1911
RETAIL SELLING AND STORE MANAGEMENT
Paul H Neystrom, 1914
RETAIL SELLING AND RETAIL SALESMANSHIP
International Library of Technology, vol 118 and 119

AVAILABLE APPLIANCES FOR VARIOUS CLASSES OF WORK

Assayers and Metallurgical Workers

Water heaters
Pumps
Steam boilers
Laboratory stoves
Japanning ovens
Furnaces, annealing, muffle tube and crucible types
Ozonators
Vacuum cleaners

Automobile Builders Repair Shops and Garages

Buffing and grinding lathes
Soldering irons
Branding irons
Welding and riveting machines
Drying ovens
Hardening furnaces
Drills
Pumps
Vulcanizers
Solution tanks
Oil tempering baths
Disc stoves
Ventilating and buzz fans

Architectural Wood Working and Cabinet Makers

Wood working machines
Glue and wax heaters
Spraying apparatus
Drying ovens (special)
Disc stoves
Soldering irons
Drills
Ventilating and buzz fans

Awning, Shade and Flag Manufacturers

Sewing machine motors
Flat irons
Disc stoves
Buzz fans
Soldering irons
Ventilating fans
Cloth cutting machines
Vacuum cleaners
Ozonators

Barber Shops

Sterilizers
Water heaters
Vibrators
Hair dryers
Curling irons
Curling iron heaters
Disc stoves
Buzz fans

Butcher Shops and Packing Houses, Wholesale and Retail

Buffing and grinding lathes
Meat chopping machines
Bone cutting machines
Branding irons
Disc stoves
Ventilating and buzz fans
Ozonators

Box Manufacturers (wood and paper)

Glue and wax heaters
Branding irons
Drying ovens (special)
Disc stoves
Ventilating and buzz fans

Boiler Makers, or General Machine and Foundry Work

Hardening and annealing furnaces
Forge blowers
Hammers and drills
Riveting and welding machines
Buffing and grinding lathes
Glue heaters
Soldering irons
Disc stoves
Pumps
Ventilating and buzz fans

Bakeries

Dough mixers
Cake machines
Ovens
Fruit cutting machines
Frying kettles
Disc stoves
Ventilating and buzz fans
Fruit paring machines
Cleaning and greasing machines

Bottling Establishments

Bottle washing machines
Bottle drying machines
Bottle filling machines
Pumps
Branding irons
Laboratory stoves
Ventilating and buzz fans

(Metallic) Bed Manufacturers

Annealing ovens
Drills
Soldering irons
Disc stoves
Lacquer drying ovens
Ventilating and buzz fans

Can Manufacturers and Canning Establishments

Soft metal furnaces
Soldering irons
Can capping tools and machines
Welding and riveting machines
Drills
Buffing and grinding lathes
Buzz fans
Laboratory stoves

Carriage and Wagon Manufacturers

Wood working machines
Forge blowers
Drills
Soldering irons
Branding irons
Disc stoves
Pitch kettles
Glue heaters
Buzz fans

Users of Cement

Laboratory stoves
Drying ovens (special)
Buzz fans

Carpenter Shops

Wood working machines
Soldering and branding irons
Glue and wax melters
Buffing and grinding lathes
Buzz fans
Disc stoves
Drills

Cutlery Manufacturers

Buffing and grinding lathes
Oil tempering baths
Drills
Solution tanks
Japanning ovens
Branding irons
Hardening furnaces

Confectioners

Ventilating and buzz fans
Chocolate and bon bon dipping apparatus
Disc stoves
Batch warmers
Chocolate mixers and storage tanks
Drink mixers
Freezers
Ice cutting and shaving machines

Chemical Laboratories and Manufacturers of Chemists' Supplies

Sterilizers
Bath and tank heaters (special)
Laboratory stoves
Ether heaters
Test tube heaters
Muffle and melting furnaces
Oil tempering baths
Pumps
Ventilating and buzz fans
Water heaters

Manufacturers of Celluloid Novelties

Heaters for softening celluloid (special)
Embossing machines
Buzz fans
Die heaters
Laboratory stoves
Tool hardening furnaces
Annealing furnaces

Cleaning and Dying Establishments

Vat heaters (special)
Clothes dryers
Hatters' apparatus
Flat-irons
Mangles
Washing machines
Disc stoves
Puff irons
Buzz fans
Vacuum cleaners
Ozonators

Cigar and Cigarette Manufacturers

Disc stoves
Buzz fans
Drying ovens (special)
Branding irons
Glue pots
Ozonators
Vacuum cleaners

Corset Manufacturers

Form heaters (special)
Buzz fans
Sewing machine motors
Disc stoves
Cloth cutting machines
Flat irons
Ozonators
Vacuum cleaners

Manufacturers of Dentists' Supplies

Water heaters
Laboratory stoves
Drills
Glue heaters
Soldering irons
Buffing and grinding lathes
Buzz fans

Manufacturers of Feather Novelties

Ventilating and buzz fans
Die tank heaters (special)
Drying closets (special)
Disc stoves
Vacuum cleaners
Ozonators
Electric steamers

Flooring Manufacturers

Glue and wax heaters
Vacuum cleaners
Buzz fans
Disc stoves
Surfacing machines

Furniture Manufacturers and Dealers

Wood working machines
Glue and wax heaters
Soldering and branding irons
Flat-irons
Sewing machine motors
Buzz fans
Wood drying ovens (special)
Spraying apparatus
Disc stoves

Fur Dealers

Ventilating and buzz fans
Die tank heaters (special)
Fur whipping machines
Disc stoves
Sewing machine motors
Ozonators
Vacuum cleaners

Grocery Stores Wholesale and Retail
Coffee mills
Ventilating and buzz fans

Garages
Radiators
Pumps
Vulcanizers
Glue heaters
Soldering irons
Buffing and grinding lathes

Glass Workers
Annealing furnaces
Water heaters
Buzz fans
Wax melters
Disc stoves

Garment Manufacturers
Sewing machine motors
Ventilating and buzz fans
Cloth cutting machines
Washing machines
Disc stoves
Flat-irons
Ozonators
Vacuum cleaners

Handkerchief Manufacturers
Cloth cutting machines
Sewing machine motors
Flat-irons
Ozonators
Vacuum cleaners
Ventilating and buzz fans

Hospitals
Sterilizers (all types)
Laboratory stoves
Heating pads
Water heaters
Incubators
Cooking appliances
Flat-irons
Washing machines
Mangles
Ventilating and buzz fans
Ozonators
Vacuum cleaners

Hotels, Restaurants and Tea Rooms
Ranges
Disc stoves
Broilers and grids
Toasters
Coffee urns
Water heaters
Frying kettles
Bread and cake mixers
Coffee mills
Meat chopping machines
Vegetable paring machines
Freezers
Buffing and grinding lathes
Ventilating and buzz fans
Ozonators
Vacuum cleaners

Hatters and Hat Manufacturers
Blocking machines
Moulding machines
Disc stoves
Sewing machine motors
Velouring stoves
Flanging bags
Flat-irons
Curling irons
Finishing irons
French irons
Ventilating and buzz fans

Artificial Hair Supply Dealers
Dye tank heaters (special)
Hair dryers
Water heaters
Disc stoves
Curling irons
Curling iron heaters
Buzz fans

Hosiery Manufacturers
Sewing machine motors
Form heaters (special)
Flat-irons
Die tank heaters (special)
Ozonators
Vacuum cleaners

Hair Dressing and Manicuring Establishments
Hair dryers
Vibrators
Water heaters
Curling irons
Curling iron heaters
Disc stoves
Buzz fans

Japanning Work (numerous industries)
Ovens (standard and special)
Disc stoves
Solution tanks
Glue heaters
Soldering irons
Buzz fans

Jewelry Manufacturers
Buffing and grinding lathes
Oven, muffle and crucible furnaces
Disc stoves
Washing machines
Vacuum cleaners
Soldering irons
Buzz fans

Knit Goods Manufacturers
Sewing machine motors
Flat-irons
Ventilating and buzz fans
Ozonators
Vacuum cleaners

Lamp and Fixture Manufacturers
Solution tanks
Annealing furnaces
Oil tempering baths
Lacquer drying ovens
Buffing and grinding lathes
Glue and wax heaters
Soldering irons
Disc stoves
Ventilating and buzz fans

LAUNDRIES AND LAUNDRY SUPPLIES

Washing machines
Wringers
Disc stoves
Tank heaters (special)
Water heaters
Mangles
Linen marking machines
Clothes dryer
Flat-irons
Ventilating and buzz fans

LEATHER INDUSTRIES AND MANUFACTURERS OF LEATHER GOODS

Solution tanks
Tank heaters (special)
Glue and wax heaters
Soldering irons
Branding irons
Creasing irons
Water heaters
Embossing machines
Flat-irons
Buffing and grinding lathes
Folding machines
Seam rubbing machines
Crimping machines
Wax knife heater
Disc stoves
Ventilating and buzz fans

MACHINE AND TOOL MANUFACTURING

Solution tanks
Welding and riveting machines
Soldering irons
Branding irons
Drills and hammers
Buffing and grinding lathes
Oil tempering baths
Disc stoves
Oven furnaces
Ventilating and buzz fans

MARBLE AND STONE DEALERS

Rock and stone drills
Surfacing machines
Disc stoves
Ventilating and buzz fans

MANUFACTURERS OF METAL NOVELTIES

Annealing ovens
Lacquer drying ovens
Drills
Soldering irons
Glue and wax heaters
Solution tanks
Oil tempering baths
Buffing and grinding lathes
Disc stoves
Ventilating and buzz fans

MILLINERY MANUFACTURING

Sewing machine motors
Cloth cutting machines
Disc stoves
Flat-irons
Hatters apparatus
Ventilating and buzz fans
Vacuum cleaners
Ozonators

MATTRESS MANUFACTURING

Cloth cutting machines
Sewing machine motors
Flat-irons
Disc stoves
Ventilating and buzz fans

MOTOR AND BICYCLE MANUFACTURING

Hardening and annealing furnaces
Japanning and lacquering ovens
Pumps
Soldering irons
Buffing and grinding lathes
Glue heaters
Disc stoves
Branding irons
Vulcanizers
Ventilating and buzz fans
Drills
Oil tempering baths

MANUFACTURERS OF OPTICAL GOODS

Buffing and grinding lathes
Drills
Soldering irons
Glue and wax heaters
Embossing presses
Disc stoves
Annealing furnaces
Ventilating and buzz fans
Heaters for softening celluloid (special)

PIANO MANUFACTURERS

Wood working machines
Wood drying ovens (special)
Spraying apparatus
Soldering and branding irons
Glue heaters
Solution tanks
Disc stoves
Annealing furnaces
Lacquer drying ovens
Ventilating and buzz fans

PAINT AND VARNISH MANUFACTURERS

Pumps
Water heaters
Testing ovens
Spraying machines
Buzz fans
Ventilating fans
Disc stoves
Test tube heaters

PEARL GOODS MANUFACTURERS

Glue and wax heaters
Soldering irons
Solution tanks
Embossing machines
Die heaters
Buffing and grinding lathes
Ventilating and buzz fans

Physicians and Dentists

- Sterilizers
- Water heaters
- Laboratory lathes
- Laboratory stoves
- Vibratory outfits
- Buzz fans

Schools

- Cooking appliances, for domestic science equipments
- Equipments for industrial instruction, such as buffing and grinding lathes, glue pots, soldering irons, etc.
- Ventilating and buzz fans
- Ozonators
- Vacuum cleaner
- Flat-irons

Sign Manufacturers

- Buffing and grinding lathes
- Glue heaters
- Soldering irons
- Lacquer drying ovens
- Drills
- Disc stoves
- Ventilating and buzz fans

Upholsterers

- Cloth cutting machines
- Sewing machine motors
- Flat-irons
- Disc stoves
- Glue heaters
- Soldering irons
- Buzz fans
- Vacuum cleaners

Wire Goods Manufacturers

- Buffing and grinding lathes
- Drills
- Soft metal furnaces
- Soldering irons
- Japanning and lacquering ovens
- Disc stoves
- Ventilating and buzz fans

Printers, Publishers and Lithographers

- Press heads
- Embossing machines
- Wire stitching machines
- Die heaters
- Glue and wax heaters
- Drying closets (special)
- Drying papers (special)
- Drying ink (special)
- Matrix heaters
- Soft metal furnaces
- Soldering irons
- Disc stoves
- Back heaters
- Pallet die heaters
- Gilding wheel
- Ventilating and buzz fans

Shirt Manufacturers

- Washing machines
- Mangles
- Cuff and collar moulding machines
- Disc stoves
- Flat-irons
- Cloth cutting machines
- Sewing machine motors
- Linen marking machine
- Ventilating and buzz fans

Trunk Manufacturers

- Buffing and grinding lathes
- Drills
- Lacquer drying ovens
- Creasing tools
- Soldering irons
- Branding irons
- Glue heaters
- Disc stoves
- Ventilating and buzz fans

Umbrella Manufacturers

- Solution tanks
- Lacquer drying ovens
- Glue heaters
- Soldering irons
- Cloth cutting machine
- Sewing machine motor
- Flat-irons
- Ventilating and buzz fans

Factories, Churches, Halls, Theatres and all Places of Amusement

- Radiators
- Ozonators
- Ventilating and buzz fans
- Vacuum cleaners

Photographers and Photographic Supplies

- Water heaters
- Glue and wax heaters
- Bath and tank heaters (special)
- Film dryers (special)
- Plate dryers (special)
- Disc stoves
- Flat-irons
- Ventilating and buzz fans

Shade and Curtain Manufacturers

- Cloth cutting machines
- Sewing machine motors
- Flat-irons
- Ventilating and buzz fans
- Vacuum cleaners

Testing Laboratories, Milk Depots, Etc.

- Liquid sterilizers
- Pumps
- Cream separators
- Milk testing sets
- Water heaters
- Bacteriological furnaces
- Laboratory stoves
- Ventilating and buzz fans

Wooden and Willow Ware Manufacturers

- Wood working machine
- Glue and wax heaters
- Disc stoves
- Branding irons
- Soldering irons
- Spraying machines
- Ventilating and buzz fans

DIRECTORY OF MANUFACTURERS

Branding Irons

American Electrical Heater Co., Detroit, Mich.
Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Pittsfield, Mass.
Simplex Electric Heating Co., Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Vulcan Electric Heating Co., Buffalo, N. Y.
Reimers Mfg. Co., New York, N. Y.

Bottle, Washing, Drying & Filling Machines

Bahan Filler & Filterer Co., Lawrence, Mass.
McKenna Bros., Brass Mfg. Co., Pittsburgh, Pa.

Batch Warmers

Cutler-Hammer Mfg. Co., New York, N. Y.
Simplex Elec. & Mfg. Co., Cambridge, Mass.

Bone Cutting Machines

Hobart Electric Mfg. Co., Troy, Ohio.

Bath & Tank Heaters—Special

Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Pittsfield, Mass.
Simplex Elec. Heating Co., Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Reimers Mfg. Co., New York, N. Y.

Buffing & Grinding Lathes

Emerson Elec. Mfg. Co., St. Louis, Mo.
W. Green Elec. Co., New York, N. Y.
Fidelity Electric Co., Lancaster, Pa.
Fort Wayne Elec. Works, Fort Wayne, Ind.
General Elec. Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Robbins & Meyers, Springfield, Ohio.
Racine Electric Co., Racine, Wis.

Cloth Cutting Machines

Eastman Machine Co., Buffalo, N. Y.
Universal Cutter Co., St. Louis, Mo.
American Electric Mach. Co., New York, N. Y.
Wildman Mfg. Co., Morristown, Pa.
The Wolf Elec. Promoting Co., Cincinnati, O.

Clothes Dryers

Chicago Dryer Co., Chicago, Ill.
Shannon Mfg. Co., New York, N. Y.

Chocolate Mixers and Storage Tanks

Cutler-Hammer Mfg. Co., New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Cuff & Collar Moulding Machines

Simplex Elec. & Heating Co., Cambridge, Mass.
Reimers Mfg. Co., New York, N. Y.

Coffee Mills

The Hobart Elec. Mfg. Co., Troy, Ohio.
The Enterprise Mfg. Co., Philadelphia, Pa.
The Coles Mfg. Co., Philadelphia, Pa.
The Computing Scales & Fixture Co., Cincinnati, Ohio.
A. J. Deer Co., Cornell, N. Y.
Royal Electric Co., New York, N. Y.
Landers, Frary & Clark, New Britain, Conn.

Chocolate Dipping Apparatus

The Cutler-Hammer Mfg. Co., New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Creasing Tools

Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Pittsfield, Mass.
Simplex Elec. Heating Co., Cambridge, Mass.
Vulcan Elec. Heating Co., Buffalo, N. Y.

Cake Mixers

Read Machine Co., York, Pa.
J. H. Day Co., Cincinnati, O.
Champion Mche. Co., Joliet, Ill.

Dough Mixers and Greasing Machines

Read Machine Co., York, Pa.
J. H. Day Co., Cincinnati, O.
Champion Mche. Co., Joliet, Ill.
The Triumph Elec. Co., Cincinnati, O.
H. Gottschalk & Co., Burnham, Pa.
Wolf Co., Chambersburg, Pa.

Dish Washers

Domestic Utilities Co., New York, N. Y.
Fearless Dishwasher Co., Rochester, N. Y.
Hamilton Low Co., New York, N. Y.
Perfection Mfg. Co., Portland, Me.
Antosam Dish Washing Co., New York, N. Y.
G. S. Blakeslee Co., New York, N. Y.
Bromley Merselees, New York, N. Y.
Walker Bros., Syracuse, N. Y.

Dairy Apparatus

Mechanical Appliance Co., Milwaukee, Wis.
D. H. Burrell Co., Little Falls, N. Y.
Creamery Package Mfg. Co., Chicago, Ill.
De La Val Machine Co.
P. R. Zeugler Co., Boston, Mass.

Drills

Chicago Pneumatic Tool Co., Chicago, Ill.
The Dulles-Baldwin Elec. Drill Co., New York, N. Y.
United States Elec. Tool Co., Cincinnati, O.
General Electric Co., Schenectady, N. Y.
Mechanical Appliance Co., Milwaukee, Wis.
Western Elec. Co., New York, N. Y.

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Whitman Bornes Co., Akron, Ohio

EMBOSSING MACHINES

Cutler-Hammer Mfg. Co., New York, N. Y.
The Miehle Press & Mfg. Co., Chicago, Ill.
Roth Tool Co., St. Louis, Mo.
Wessel Mfg. Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.
Simplex Elec. Heating Co., Cambridge, Mass.
Reimers Mfg. Co., New York, N. Y.

FRUIT CUTTING MACHINES

The Enterprise Mfg. Co., Philadelphia, Pa.
Barnhart Mercantile Co., St. Louis, Mo.
Federal Elec. Co., Chicago, Ill.

FANS

Crocker-Wheeler Co., Ampere, N. J.
Adams-Bagnall & Co., Chicago, Ill.
Diehl Mfg. Co., Elizabethport, L. I.
Emerson Elec. Co., St. Louis, Mo.
General Elec. Co., Schenectady, N. Y.
Robbins & Myer Co., Springfield, O.
Western Electric Co., New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Howard & Morse Co., New York, N. Y.
Acme Ventilating Co., Chicago, Ill.
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Detroit, Mich.
Dayton Fan & Motor Co., Dayton, Ohio
B. F. Sturtevant Co., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York, N. Y.
Illg. Ventilating Co., New York, N. Y.

FURNACES

American Elec. Furnace Co., New York, N. Y.
Hoskins Mfg. Co., Detroit, Mich.
W. Green Elec. Co., New York, N. Y.
Keystone Elec. Instrument Co., Philadelphia, Pa.
Pelton & Crane Co., Detroit, Mich.
Eimer & Amend Co., New York, N. Y.
Multiple Unit Co., New York, N. Y.

FORGE BLOWERS

Electric Blower Co., Boston, Mass.
Emerson Elec. Mfg. Co., St. Louis, Mo.
Buffalo Forge Co., Buffalo, N. Y.
Champion Forge Blower Co., Lancaster, Pa.

GLUE HEATERS

American Elec. Heater Co., Detroit, Mich.
Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Pittsfield, Mass.
Simplex Elec. Heating Co., Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Reimers Mfg. Co., New York, N. Y.
Wetmore Mfg. Co., Toledo, Ohio

HATTERS APPARATUS

Cutler-Hammer Mfg. Co., New York, N. Y.
General Elec. Co., Pittsfield, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Fidelity Elec. Co., Lancaster, Pa.
Simplex Elec. Heating Co., Cambridge, Mass.
Saylor Electric Co., Pittsburgh, Pa.
Reimers Mfg. Co., New York, N. Y.

HEATERS FOR GENERAL USES (Special)

Cutler-Hammer Mfg. Co., New York, N. Y.
General Elec. Co., Schenectady, N. Y.
Simplex Elec. Heating Co., Cambridge, Mass.
Western Electric Co., New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
V. Weber & Co., Newark, N. J.
Vulcan Electric Heating Co., Buffalo, N. Y.
Reimers Mfg. Co., New York, N. Y.

HOSPITAL & LABORATORY INCUBATORS

Eimer & Amend Co., New York, N. Y.
V. Weber & Co., Newark, N. J.
Hospital Supply Co., New York, N. Y.
Hoskins Mfg. Co., Detroit, Mich.
Kny Schere Mfg. Co., New York, N. Y.
Scientific Specialty Co., New York, N. Y.

LAUNDRY & TAILOR IRONS

American Elec. Heater Co., Detroit, Mich.
Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Pittsfield, Mass.
Dover Mfg. Co., Canal Dover, Ohio
Hot Point Electric Heating Co., Ontario, Cal.
Landers, Frary & Clark Co., New Britain, Conn.
Manhattan Elec. Supply Co., New York, N. Y.
Pelouze Elec. Mfg. Co., Chicago, Ill.
Vulcan Elec. Heating Co., Buffalo, N. Y.
Simplex Elec. Heating Co., Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Reimers Mfg. Co., New York, N. Y.

ICE CUTTERS, CHOPPERS & SHAVERS

F. C. Whitney Co. Boston, Mass.
Reinhold Mfg. Co., Detroit, Mich.
R. A. Dewsberry, Chicago, Ill.

ICE CREAM FREEZERS

F. C. Whitney Co., Boston, Mass.
Reinhold Mfg. Co., Detroit, Mich.
R. A. Dewsberry, Chicago, Ill.
Danan Mfg. Co., Cincinnati, O.

KNIFE POLISHER

Coles Mfg. Co., Philadelphia, Pa.
Mechanical Appliance Co., Milwaukee, Wis.

Cincinnati Elec. Tool Co., Cincinnati, O.
Duparquet, Huot & Moneuse, New York, N. Y.

LINEN MARKING MACHINE

Nat'l Marking Mach. Co., Cincinnati, O.
S. M. Supplies Co.. Boston, Mass.
Troy Laundry Mach. Co., Chicago, Ill.

LIFTING MAGNETS

Cutler-Hammer Mfg. Co., New York, N. Y.
Independent Elec. Mfg. Co., Milwaukee, Wis.
Chicago Pneumatic Tool Co., Chicago, Ill.
Sundh Elec. Co., New York, N. Y.

MEAT CHOPPERS

Cleveland Meat Chopper Co., Cleveland, O.
Computing Scale Co., Cincinnati. Ohio
Enterprise M'fg. Co., Philadelphia, Pa.
Hobart Elec. Mfg. Co., Troy, Ohio
J. E. Smith Co., Buffalo, N. Y.
Stimpson Mercantile Equip. Co., Northville, Mich.
Landers, Frary & Clark Co., New Britain, Conn.

MANGLES

American Ironing Mche. Co., Chicago, Ill.
American Laundry Mche. Co., Rochester, N. Y.
Troy Laundry Mche. Co., Chicago, Ill.
The Steel Roll Mche. Co., Chicago, Ill.
Eden-Brokaw Co., Chicago, Ill.

MILK TESTING APPARATUS

D. H. Burrell & Co., Little Falls, N. Y.
International Instrument Co., Cambridge, Mass.
Simplex Elec. Heating Co., Cambridge, Mass.

METAL MELTING POTS

Cutler-Hammer Mfg. Co., New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.

OVENS

American Elec. Heater Co., Detroit, Mich.
Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.
Hot Point Elec. Heating Co., Ontario, Cal.
Landers, Frary & Clark Co., New Britain, Conn.
The Multiple Unit Elec. Co., New York, N. Y.
Hoskins Mfg. Co., Detroit, Mich.
Keystone Elec. Instrument Co., Philadelphia, Pa.
Simplex Elec. Heating Co., Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilmot-Castle Co., Rochester, N. Y.

OZONATORS

The Carrier Air Conditional Co., New York, N. Y.
S. W. Cramer Co., Charlotte, N. C.
Duntley Mfg. Co., Chicago, Ill.
Ozone Pure Airifier Co., Chicago, Ill.
Standard Electro Utilities Co., Chicago, Ill.
Federal Sign System Co., Chicago, Ill.
General Elec. Co., Schenectady, N. Y.
The Kauffman Heating & Mfg. Co., St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

PUMPS

Bishop, Babcock, Becker Co., Cleveland, O.
Allis-Chalmers Co., Milwaukee, Wis.
Dayton Pump & Mfg. Co., Dayton, Ohio
The Dal Mfg. Co., Chicago, Ill.
Kellogg Mfg. Co., Rochester, N. Y.
Hartford Mche. & Screw Co., Hartford, Conn.
United States Elec. Tool Co., Cincinnati, O.
Luitwieler Pumping Engine Co., Rochester, N. Y.

PITCH KETTLES

Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.
Simplex Elec. Heating Co, Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

RIVETTING APPARATUS

Chicago Pneumatic Tool Co., Chicago, Ill.
Vandorn Elec. Tool Co., Cleveland, Ohio
United States Elec. Tool Co., Cincinnati, O.

RADIATORS

American Elec. Heater Co., Detroit, Mich.
Cutler-Hammer Mfg. Co., New York, N. Y.
Dublier-Elec. Co., New York, N. Y.
General Electric Co., Pittsfield, Mass.
Hot Point Elec. Heating Co., Ontario, Cal.
Simplex Elec. Heating Co., Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Reimers Mfg. Co., New York, N. Y.
Prometheus Elec. Co., New York, N. Y.
Dispatch Mfg. Co., Minnesota.

REFRIGERATING EQUIPMENTS

Automatic Refrig. Co., Hartford, Conn.
Brunswick Refrig. Co., New Brunswick, N. J.
Mechanical Refrigerator Co., Chicago, Ill.
Montclair Refrigerator Co., Montclair, N. J.
Westerberg & Williams, New York, N. Y.
H. W. Johns-Manville Co., New York, N. Y.
Germania Refrigerating Co., Belleville, Ill.

STERILIZERS

American Elec. Heater Co., Detroit, Mich.
Cutler-Hammer Mfg. Co., New York, N. Y.
Eimer & Amend Co., New York, N. Y.
V. Weber & Co., Newark, N. J.
Wilmot-Castle Co., Rochester, N. Y.
The Presto Elec. Mfg. Co., San Francisco, Cal.
Simplex Elec. Heating Co., Cambridge, Mass.

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Prometheus Elec. Co., New York, N. Y.
Bramhall Deane Co., New York, N. Y.

SEWING MACHINE MOTORS

Bissell Motor Co., Toledo, Ohio
Diehl Mfg. Co., Elizabethport, N. J.
Emerson Elec. Mfg. Co., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Fidelity Elec. Co., Lancaster, Pa.
Hamilton-Beach Mfg. Co., Racine, Wis.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SURFACING MACHINES

American Floor Surfacing Machine Co., Toledo, Ohio
Floor Sanding & Polishing Machine Co., Philadelphia, Pa.
Kelley Electric Machine Co., Buffalo, N. Y.
Ransome Concrete Machine Co., Dunellen, N. J.
Electric Rotary Mche. Co., Chicago, Ill.

SOLDERING IRONS

Acme Elec. Heater Co., Detroit, Mich.
Economy Elec. Co., Brooklyn, N. Y.
General Elec. Co., Pittsfield, Mass.
Manhattan Elec. Supply Co., New York, N. Y.
Simplex Elec. Heating Co., Cambridge, Mass.
Vulcan Elec. Co., Buffalo, N. Y.
Western Elec. Co., New York City

SOLUTION TANKS

Cutler-Hammer Mfg. Co., New York, N. Y.
Eimer & Amend Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.
Simplex Elec. Heating Co., Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SPRAYING MACHINES

J. W. Maddox Co., Jamestown, N. Y.

VULCANIZERS

C. A. Shaler Co., Waupun, Wis.
Buffalo Elec. Vulcanizer Co., Buffalo, N. Y.
J. L. Gibney Co., Philadelphia, Pa.
Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.

WATER HEATERS

Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Schenectady, N. Y.
Manhattan Elec. Supply Co., New York, N. Y.
Landers, Frary & Clark Co., New Britain, Conn.
American Elec. Heater Co., Detroit, Mich.
Kalor Co., New York, N. Y.
Geyser Patent Holding Co., Hartford, Conn.
Hot Point Elec. Heating Co., Ontario, Cal.
Simplex Elec. Heating Co., Cambridge, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

WAX HEATERS

American Elec. Heater Co., Detroit, Mich.
Cutler-Hammer Mfg. Co., New York, N. Y.
General Electric Co., Pittsfield, Mass.
Simplex Elec. Heating Co., Cambridge, Mass.
Vulcan Elec. Heating Co., Buffalo, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Manhattan Elec. Supply Co., New York, N. Y.

WOODWORKING MACHINES

Berlin Mche. Wks., Detroit, Mich.
American Woodworking Mche. Co., Rochester, N. Y.

WELDING APPARATUS

Toledo Elec. Welder Co., Cincinnati, O.
Nat'l Elec. Welder Co., Warren, Ohio.
Thomson Elec. Welding Co., Lynn, Mass.
American Elec. Welding Co., New York, N. Y.
Universal Elec. Co., New York, N. Y.

DISCUSSION

MR. C. N. STANNARD, Denver: I very greatly enjoyed reading the complete report of the Committee. I feel from my observation of the work that I would be more than fully repaid for coming to San Francisco if not another report was read or discussed. It seems to me that Chairman Young and those assisting him in the compilation of this pamphlet have done us a great service, and that we owe them all a debt of gratitude, and the recommendation is made that a committee be appointed to continue the work, although for my part I hardly see what the Committee can do except perhaps to keep the report up to date.

I have been asked to say a few words on card systems, and meetings of representatives. I am heartily in favor of a very complete card system, the prospect card to be a combination card, on which a complete record is maintained of prospects on the lines and the appliances installed. This is not so difficult when it has once been systematized.

A house-to-house canvass should be first made by the salesmen. From their reports, which should cover both prospects and appliances, the data for the combination prospect cards are obtained. These will be corrected from time to time from the daily call sheets and sales sheets. Some cross-indexing should be done also if two or three card systems are used. This is not expensive work as the ordinary clerks in the commercial department can give it a part of their time.

The morning meetings and a weekly meeting give us the opportunity to supply information not always directly connected with our work, but incidentally connected with our work, and the meetings, I believe, are of wonderful value. The most important feature of the morning meeting, to my mind, is the amount of enthusiasm that is generated in the men. They are full of it when they leave the meeting and go out after prospects. We have tried both methods, having and not having meetings. We found the latter a dismal failure and speedily went back to the old method.

The report mentioned salaries. I am a hearty believer in good salaries. I want the men to always feel at rest so far as salary is concerned. They should have compensation sufficient so that they will not have to worry about how they are to meet their bills at the end of the month. I am also heartily in favor of the men having an interest in the revenue which they produce for the company. That is not such a difficult matter to arrange. I might mention one scheme. A man will be paid a fixed salary. Add to that a certain percentage of the increase in the gross revenue that the company gets in a month. How do you determine that? If you have an up-to-date tabulating system it is very easy, without referring to the general books or the consumers' books, to ascertain the increase in your revenues. After that has been figured, then from the same tabulating system get the increase in the gross revenue from the various districts in which the representatives are employed. That determines the percentage of increase in gross revenue that they have secured in their respective territories, and on that basis we can ascertain the percentage of increase in gross revenue that is to be set aside for their commissions.

Some companies are in favor of giving the men 5 or 10 per cent of the increased gross revenue. If that represents say, $500 or $1,000, a man who secures a 10 per cent increase in the gross gets out of this $500 or $1,000 $50 or $100. The result of this is that a man is not so interested in selling some appliance, for possibly a large sum of money, that will bring the company only three or four dollars a month revenue; he is trying to sell an appliance that may cost the consumer only three or four dollars but which will take from the Company $40, $50 or $100 worth of current per month. That is the thing we are most interested in, the amount of revenue that we can secure; hence the point I make is that the salesmen should be personally interested in the revenue.

I am greatly interested in the list of industrial appliances given here. There are wonderful possibilities in that field. However, some of us here to-day, we combination men, have other things to consider. We must leave something for the gas division of our business in Denver. We have lost practically all the lighting to the electrical end. We must sell gas for domestic and industrial purposes, or else we shall have a big investment on our hands with no return from it and it strikes me that these combination companies should use great care in dividing up this class of business.

MR. W. W. BRIGGS, San Francisco: I have not had an opportunity as yet to study this report in detail, having been engaged in providing some of the entertainment which you have had here. In glancing through it hastily, I note continual references to the cutting of prices. Without any desire at all to be the "fly in the ointment," or to make invidious criticisms, I wish to state at this time, if I may take the liberty of doing so, that I think central station men particularly should avoid any reference whatever to price cutting. There is a psychological condition here which would indicate that if a salesman can cut the other fellow's price he may be able to cut his own. We in the West have had some experience in this appliance campaign work. Due to acute competition, and low energy cost to the householder, I think our general situation here is one more nearly approximating saturation than you will find in other sections. I might mention one of our cities where for some years past flat rates have been in effect. I think I may say without violating the confidence of the gentleman interested in that company and who gave me the facts, that approximately six months ago they put on an aggressive campaign for the sale of appliances, made 460 calls, and sold one flat-iron. The flat rate made the cost of energy so low that anybody could use an appliance, and they did not quibble at the price of the appliance.

The fact of the matter is, we should absolutely join hands with the manufacturer, dealer, contractor and jobber, and endeavor to maintain their prices if they are fair and equitable. If we begin to cut the prices of these men they will become discouraged and in time will cease to do business in such material, and the selling of appliances will ultimately fall upon the central stations. Then, if the manufacturer does not receive adequate compensation, he will discontinue and the central stations will have to enter into the manufacture of appliances. I should hesitate to undertake anything of that kind.

I feel rather strongly on this subject of price maintenance. It has a reflex action on the rate for energy supplied, and not by even idle thought should we ever consider that those prices should be cut. Rather let them raise them, particularly on the Pacific Coast. I am absolutely and positively opposed to even mentioning the words "cutting prices."

MR. M. O. DELLPLAIN, Syracuse, N. Y.: I am very glad to hear the hearty applause in response to the remarks of the last speaker with reference to cutting prices. I remember that during the several sessions of this Committee the matter of price cutting was thoroughly discussed and it was the almost unanimous opinion of the Committee that they go on record absolutely and unequivocably in favor of the policy of maintaining prices. I believe the only reason it is not emphasized in the report is because we felt that the correctness of the theory of the maintenance of prices has already been acknowledged by the several companies. In any event, we hoped that some of those who insisted on considering the non-maintenance of prices as being a good merchandising proposition, would soon see the light, and that we should not dignify it by giving it serious mention in the report. There is no question that it is only a matter of time before central stations will be unanimous in the practice of an absolute maintenance of prices. It is the only economically sound practice. Let us hope that Mr. Young's report will be accepted very generally by the member companies, and that the theories outlined therein be put into more active practice.

I believe that a careful perusal of the first section of the report which treats of the subject of merchandising will convince you all that it is certainly an excellent treatise on the subject. It goes into the proposition from the standpoint of a merchant, not a central station man, one who sells appliances as a business in the same way that a department store sell dry goods as a business. For that reason if we will as business men adopt the theories and the fundamental principles outlined in that section of the report, I think we shall all gain something to our advantage.

As to the industrial section of the report, I believe that very few of us realize the great importance of this branch of the work. A previous speaker has mentioned the fact that combination companies might well afford to put the soft pedal on this subject. I am a representative of a combination company, and my experience is that all the exploiting of electrical industrial appliances that we have done is not hurting our gas industrial appliances one bit, in fact, we believe it is helping it. I am convinced that the more you push one side of your business, the more you build up the other side. This industrial appliance proposition is very important. I want to second as strongly as I can the suggestion that the industrial appliance proposition be continued into future years, because I believe we are just on the threshold of that promising part of our business.

MR. HENRY O. LOEBELL, New York City: I do not believe that in the history of the central station an opportunity has ever been at hand as great as the opportunity that presents itself before us now in the development of industrial heating appliances. The possibilities are greater than those that confronted us when the first motor was developed, or the first lamp was developed.

My statement is not prompted by optimistic views, and it is not prompted by enthusiasm without proper backing. It is a view based absolutely upon engineering knowledge from actual experience. There are probably three particular points of view, one, that of the central station, another of the customer and the third of the engineer who has the problems to solve. To the central station the industrial heating business is an ideal load. In a majority of cases close to 100 per cent and never less than 50 per cent of the load-factor is used. Now is the psychological moment to do the development work along that line. I do not refer to that class of the industrial business that is today monopolized by the gas industry, or to that class that pertains to either gas or electricity, depending upon locality. I refer to the large bulk of business that is carried on today with the use of fuel oil. The reason fuel oil is used is because gas can not do the work with the present appliances. Coal or coke are not adaptable, and therefore the only solution of certain problems is fuel oil.

Something happened recently in the oil business and a new system of refining has been introduced, which to a very large extent eliminates fuel oil as a by-product. It is a question of time only, and not more than two or three years at that, before fuel oil will be off of the market entirely. If it had not been for the war and some other causes probably this year fuel oil would have been very scarce and the price would have gone up high.

Some of you gentlemen who have looked into this problem may wonder how it is possible to compete with oil which sells on an average for two cents per gallon, weighing 7½ lb per gallon with about 19 000 heat units per pound, as against current costing one cent per kilowatt-hour. A problem that is looked upon from that point of view is an almost desperate one. The manufacturers of devices and commodities are not interested in the cost of fuel, they are interested in cost of production and conditions of operation. All fuels in ratio of efficiency lie possibly between two points; that of temperature of operation and the plain temperature of the fuel. Suppose the operation of forging requires a temperature of 2500 deg. fahr., and the flame temperature is 2600 deg. fahr., the thermal efficiency of operation is only 4 per cent—maximum 4 per cent. If we had to compete with energy that gives 30 times as much per heat unit we could obtain efficiency 30 times as high with electric energy. From practical experience I know that we can apply electricity at current rates in competition with fuel at current prices and get the business and hold it. The obstacles that are in the way are a few mechanical details that have still to be developed.

There is no doubt in my mind that some of the business that the gas companies hold at the present time will soon be taken over as electric. I do not believe the gas industry is going to stand in the way of the electrical industry, and the gas companies should get busy and develop appliances that will be as efficient as electrical appliances.

I have recently made an installation in the city of Toledo which displaced gas at a low temperature, and it appears that there are some great advantages, apparently unreasonable, in applying electrical energy to low temperature operations. All of the heat imparted from fuel is the result of chemical combustion, and must be carried in suspense by the flue gases. If the temperature is low your flame must be ventilated, air must be added to it in order to reduce the temperature to a degree that will not damage your work. You have all noticed the cooling, and know that the problem of ventilation enters into the combustion of gas. With electricity all the energy is formed into radiant energy. It is much more efficient than gas or other fuels.

I am very glad the Committee has given a great deal of time to industrial development and I hope the organization will carry out the suggestions made by it.

MR. M. C. OSBORN, Spokane: I am very much interested in this report. The question of merchandising is a very important one with me, and I want to state that I always stand on the price.

In the discussion of this subject I have heard no remarks as to what the appliances return in kilowatt-hours. In order to bring out something on that line I want to give you a few data in connection with our residential business. We have something like 18 000 residential consumers, and the average kilowatt-hour consumption per consumer has been constantly dropping since 1911. We have had two rate reductions during that time, and by the way, I was unable to note any increased consumption by reason of the rate reduction, and we have found, this year, that our average per residential consumer is where it was in 1911, amounting to 17½ kilowatt-hours per consumer.

Mr. George B. Johnson, Chicago: I have been a member of this Section for several years, and we have not heretofore gone into a matter of this kind in this way, but this year we decided to talk straight merchandising to you, although we realize that the principal function of the central station is to sell electric current. Our reason for doing this is that we find there are many central station men who were afraid to sell merchandise. I think if a central station man will go after this business, no matter how large or how small it may be, he will be able to get good results from it, and there is no doubt that it will also tend toward increasing the use of electricity.

Mr. O. R. Hogue, Chicago: The reduction in rates made from year to year and better efficiency in lamps will naturally reduce the income derived from residence and apartment customers. In order to maintain or increase the income it will be necessary to educate the public to use light more liberally and to take on electrically operated appliances.

In a recent campaign we sold to our customers a little over 12 000 irons. These irons were put out within 60 days. Out of every three customers our salesmen called upon they found that one customer was using an electric iron. The sale of irons in our electric shop branch stores did not materially decrease during this period. There is a large field for small industrial units.

Following are some of the installations which have proved successful and are being sold in quantities.

Units for drying ink in connection with printing presses; 8 units installed on each press, making a total load of 4 kilowatts. Of these we sold to manufacturers of printing presses 35 installations. These units are used from 8 to 24 hours per day.

Units for heating varnish, sold in connection with spraying cabinets. Manufacturers of these cabinets purchase the installations in 25 lots.

Units for removing static electricity in connection with printing presses. There is an unlimited field for these small units.

There is a large field for a 50 to 150-lb household *ice-making machine,* and various other appliances that will help to keep up the income in connection with our residence business.

Mention has been made of using the regular lighting salesmen for selling appliances. The plan seems feasible and in the past year we have been working along this line. The lighting salesmen come in close contact with residence customers when signing contracts for lighting, and at the same time they could explain to the customers the advantages of electrical appliances. If a customer is not ready to purchase at the time, a memorandum could be made and followed up later, either by the lighting salesman or an appliance salesman.

I concur with Mr. Young in his recommendation that this committee be continued and suggest that it be in the form of a permanent committee or a bureau where information could be had as to the various appliances developed and manufactured from time to time.

VICE-CHAIRMAN CALLAHAN: As has been suggested the chair will make a recommendation that the incoming officers continue this Committee.

I will call upon Mr. Young to close the discussion.

MR. YOUNG: Mr. DellPlain was perfectly correct in his statement in regard to the cutting of prices. The reference made to this subject in the report applies only to campaigns and special sales, and not to the cutting of prices of appliances when sold in the regular way.

I have made one or two notes on which I would like to say a few words. We should pay more attention to the costs of our merchandising appliances. There are very few of us who know just what the appliance business is costing us, as the accounts are not analyzed as closely as they should be. It is extremely difficult to get comparative costs of merchandising between different companies as there is no standardization of accounts which will give true comparative figures. I think it will be found that our merchandising costs, when carefully analyzed, are at least double those of other firms doing a merchandising business.

In our Sales Department we have tried a plan which has worked out very successfully. We expect from each man an increase in business equal to 25 per cent of his last year's sales. By this method he endeavors to reach the higher figure instead of being satisfied with his past record.

I was very much interested in what Mr. Loebell said on the industrial appliance and heating work. This is a comparatively new subject and, as the report shows, one in which very little progress has been made. I have had considerable experience in the gas industrial heating and appliance work and I know how difficult it is to make a start. We want to be careful, however, in going after this business not to neglect the small heating problems, as very often the small appliances, which are used a good many hours a day, bring in a larger revenue than the larger appliances, used intermittently. The report shows us what can be done if we go after this business consistently.

I want to take this opportunity to thank the men who have been on the Committee with me, because without their hearty co-operation this report would have been impossible. I noticed that a number of the speakers were altogether too modest when they said that they gave the Committee very little assistance in its work.

VICE-CHAIRMAN CALLAHAN: The Chair will entertain a motion to accept and spread the report of this Committee upon the records of the Association.

(Motion made and seconded and carried)

(Adjourned)

THIRD COMMERCIAL SESSION

WEDNESDAY AFTERNOON JUNE 9

CHAIRMAN BURNETT: The meeting will please come to order. The first report on the program for this afternoon is the report of the Lamp Committee, Mr. Frank W. Smith of New York City, Chairman. Mr. W. W. Freeman of Cincinnati, will present the report.

MR. FREEMAN: I regret very much that Mr. Smith, Chairman of the Committee—I might say the hard-working Chairman of the Committee, was detained at the last moment and prevented from coming, as he had planned to do. I am merely carrying out his instructions in presenting the report, but I would like to say at the outset that the preparation of this report has been the work of Mr. Smith, and the burden of the work throughout the year has been his, although the members of the Committee, with the exception of myself, have been very faithful in attendance at the several meetings held by the Committee during the year.

REPORT OF THE LAMP COMMITTEE

INTRODUCTION

The work of the Lamp Committee has during the past year been somewhat broader in scope than heretofore—it is hoped with beneficial results to the member companies. A number of meetings have been held, which have generally been well attended, and your Committee has endeavored to keep in rather close touch with the rapid development which has marked the past few months.

The practice of using the Association BULLETIN for the dissemination of information to member companies has been continued, this year a sub-committee undertaking the work of collecting and preparing the data. This has resulted in bringing to the members prompt and up-to-date information from time to time as to new developments, rather than in withholding this information until the presentation of the report at the annual convention. The articles on the lamp situation which have appeared in the BULLETIN since the last convention are reproduced as an appendix to this report.

Considerable direct correspondence has been carried on with the member companies, and it would seem that, to some extent, the hope expressed in former years that the Lamp Committee might be considered a "bureau of information" by the members is being more and more realized. Your Committee is of the opinion that in this manner its work can be of greater service to the membership.

In preparing this year's report, it has been thought advisable to follow the same general arrangement as heretofore, particularly as to the technical phases of the lamp business. The report is, therefore, arranged so as to indicate clearly the tendency of the demand from year to year for incandescent lamps, and to set forth in as much detail as possible the improvements which have been made from time to time in existing types of lamps, together with the development of new types, with particular reference to the past year.

The report having largely to do with the commercial aspects of the lamp business is again presented before the Commercial Section, following the policy inaugurated last year.

LAMP SALES

The disturbed condition throughout the country has had its effect upon the lamp business as well as in other directions. The aggregate sales of domestic lamps, exclusive of the miniature, totaled slightly under 100,000,000 lamps, which was the output for the year 1913, as reported by your committee; the 1913 sales being an increase over 1912 of 11 per cent.

Carrying out the comparisons made in last year's report, which showed the tendency of the lamp demand from year to year from carbon to high efficiency lamps (Table I), we find that the sales of the mazda lamp now total over 70 per cent of the domestic lamp sales, or two and one-third times the total sales of all other lamps combined. These figures demonstrate how completely the mazda lamp is replacing the lower efficiency types. The tantalum lamp has disappeared from the market.

TABLE I

Domestic incandescent lamp sales—1907 to 1914 inclusive—Showing each class—carbon, gem, tantalum and mazda in percentage of the annual total

Type	1907	1908	1909	1910	1911	1912	1913	1914
Carbon	93.27	84.12	68.98	63.08	52.90	25.47	11.85	7.11
Gem	5.88	8.58	15.07	14.88	19.00	33.59	31.41	22.36
Tantalum	0.75	1.78	2.12	3.57	2.74	1.00	0.09	.....
Mazda	0.10	5.52	13.83	18.47	25.36	39.94	56.65	70.53
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

The changes shown in the above table and the shifting of the use of lamps from one type to another during the past eight years is graphically illustrated by the curve (Fig 1).

The sales of .mazda lamps have been analyzed to indicate the relation of the various sizes in watts, in percentage of the total number of mazda lamps sold. This table, which is comparative for the annual sales for 1913 and 1914, also shows the sales of each size of multiple lamp in percentage of multiple lamp sales, together with the sales of each size of street series lamp in percentage of total street series lamps sold, this comparison being shown in the following table:—

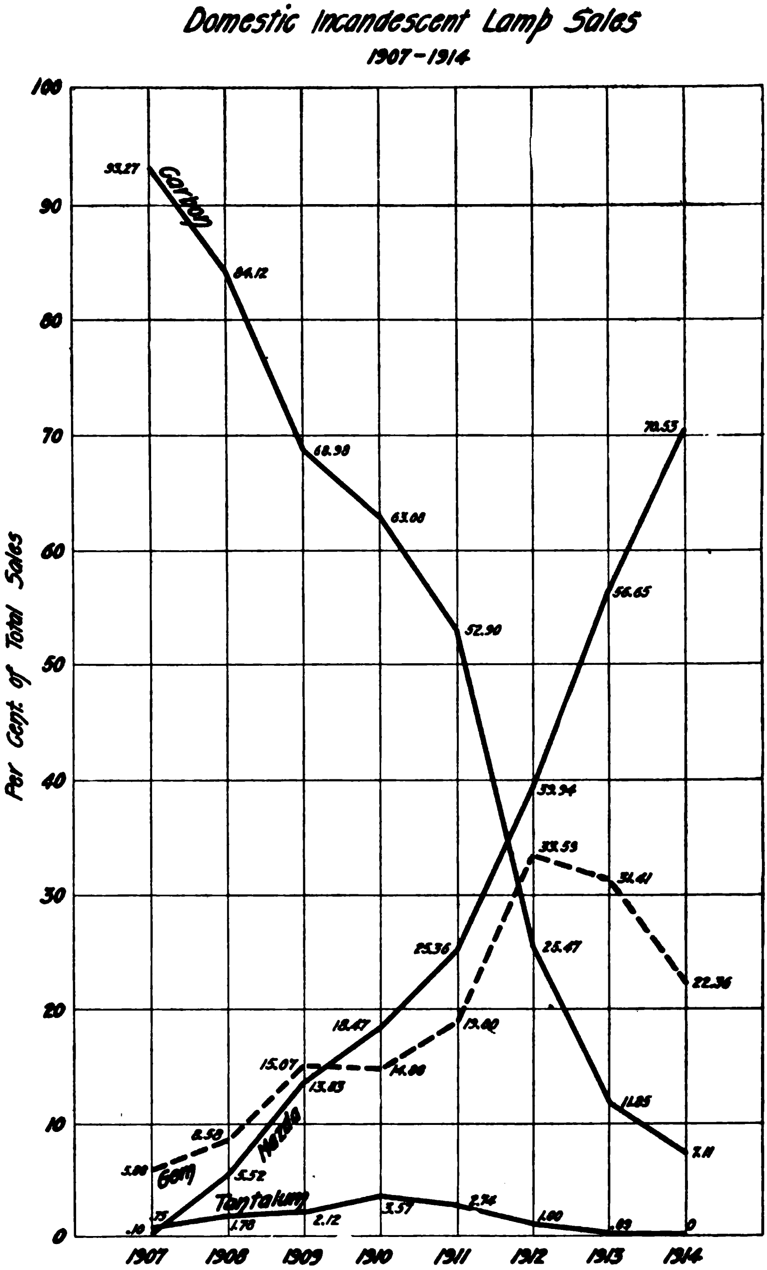

Domestic Incandescent Lamp Sales
1907-1914
Per Cent. of Total Sales
100
90
80
70
60
50
40
30
20
10
0
1907
1908
1909
1910
1911
1912
1913
1914
Carbon
93.27
84.12
68.98
63.08
52.90
25.47
11.85
7.11
Mazda
.75
5.52
13.83
18.47
25.36
39.94
56.65
70.53
Gem
5.88
8.58
15.07
14.88
19.02
33.53
31.41
22.36
Tantalum
.10
1.78
2.12
3.57
2.74
1.00
.09
0

FIG I

Regular Multiple	1913	1914	1914 % of Mazda multiple only
2½-watt	3.760	2.459	2.538
5 "			
10 "	2.761	5.091	5.257
15 "	6.300	5.704	5.891
20 "	2.592	1.817	1.988
25 "	29.340	26.780	27.659
40 "	27.110	26.323	27.189
60 "	15.085	16.724	17.271
100 "	5.722	5.799	5.973
150 "	1.093	.870	.899
200 "	.....	.272	.275
250 "	.897	.662	.674
300 "	.....	.163	.168
400 "	.094	.179	.183
500 "	.157	.203	.211
750 "	.....	.133	.139
1000 "	.....	.082	.085
Series burning			% of Mazda series only
23-watt	2.340	2.815	2.910
36 "	.545	.666	.686
		Total multiple	100.00
Street series			% of Mazda series only
32-cp	.410	.258	14.611
40 "	.497	.279	15.855
60 "	.652	.479	27.165
80 "	.222	.285	16.155
100 "	.135	.254	14.430
200 "	.091	.065	3.559
250 "	.....	.072	4.052
350 "	.015	.001	.507
400 "	.....	.030	1.464
600 "	.....	.033	1.846
1000 "	.....	.001	.300
		Total series	100.00
Miscellaneous	1.82	1.501	
	100.00	100.00	

An analysis of the relative number of mazda lamps by sizes shows for this year about the same relative importance of sizes in the regular multiple lamps as for 1913 with, however, an increased importance in the cases of the 10 and 60-watt lamps and a more general use of high wattage lamps.

METALLIZED FILAMENT LAMPS

The prediction made by the Lamp Committee in its 1914 report as to the probable falling off in demand for gem or metallized filament lamps, has been more than realized, so much so that the Committee felt it necessary to bring to the attention of member companies the fact that the actual change had largely exceeded the Committee's anticipation and, as this condition had a marked effect upon output, etc, a communication on the subject (herewith quoted in full) was sent to each member company under date of December 7, 1914.

The specifications under which these lamps are now purchased include the privilege to the manufacturers—in order to insure prompt delivery—of shipping a range in volts one volt either side of that ordered.

NEW YORK, December 7, 1914.

To the Member Companies:—

"The report of the Lamp Committee presented before the 37th Convention at Philadelphia in June last chronicled the large increase in the use of mazda lamps with a corresponding decrease in the use of gem (metalized-filament) lamps and prophesied a larger and more extended change in this direction in the near future.

"The Lamp Committee at this time desires to call attention to the fact that the actual change during the past few months has largely exceeded the Committee's anticipation. The demand for gem (metallized-filament) lamps now made upon the manufacturers is spasmodic and uncertain, with a constantly diminishing quantity. In view of the uncertainty it is impossible for the manufacturers to carry a stock to meet such a demand without being confronted with the possibility of at some time scrapping a large number of lamps.

"The manufacturers report extreme difficulty in operating the metallized factories to meet this irregular demand on an economical basis, it being necessary to continually reduce and increase the force as the demand fluctuates, which means a lower general efficiency of the force.

"The manufacturers anticipate that the production of the metallized filament lamps is very apt to become a "manufacture to order" business. The necessity is therefore pointed out for member companies to anticipate their demands for this type of lamp and to give prompt word to the manufacturers as to their probable requirements monthly for the next eight to twelve months. In the absence of such information there is apt to be an increase in the cost of production and delay in delivery. In view of the fact that the central station companies require a range of voltages—each company having originally been assigned a lamp voltage so as to equalize the curve of voltage demand and the curve of voltage production—if the reasonable parity of voltage production and demand is not maintained, it will be necessary to artificially "mark up" or "mark down" the voltage to fill orders. Any considerable irregular and uncertain relation of voltage production and demand will result in *increased cost.*

"The present largely restricted use of gem (metallized-filament) lamps and the fact that the larger percentage of such lamps now used are at the common voltage centers, 105, 110, 112 and 120 volts, coupled with inability to manufacture more than fifty per cent of each lot to a given voltage, makes it difficult, if not impossible, to retain the present limits of candle-power and wattage and dispose of lamps of off-center voltages.

"It is suggested that you make known as soon as possible your estimated requirements for metallized-filament lamps as much in advance as possible in order that the manufacturers may adjust their facilities to the best advantage of the member companies. In this connection your committee again emphasizes the necessity of a broad and liberal policy with respect to the introduction of the mazda lamp. This policy should be followed wherever the local conditions make it possible in order to encourage the use and adoption of the mazda lamp.

"It is the desire of your committee to be of service to the member companies in this or any other matter that has to do with the lamp situation and you are urged to take advantage of your committee's facilities for providing prompt and up-to-date information on the subject."

With the increase in the general use of the mazda lamp, it is interesting to compare figures on average candle-power and wattage of all lamps sold with the corresponding figures given in last year's report, complete comparison from 1907 being as follows:

	1907	1908	1909	1910	1911	1912	1913	1914
Average cp of lamps sold....	18	19	21	23	25	26	29.4	38.2
Average watts of lamps sold....	53	53	52	51	51	49	47	48

Dividing this candle-power by the wattage shows the average efficiency to be approximately 0.8 candles per watt.

Increase in the average candle-power and watts shown for 1914 is somewhat affected, of course, by the advent of the mazda C lamp. Excluding this lamp, however, we have the following figures:

Average cp, excluding mazda C, 1914 sales..........35.3
Average wattage, " " " " " ....45.

The decided increase in average candle-power is accountable from the smaller percentage of carbon and gem lamps used in 1914 and from the improvements made in the efficiency of mazda lamps.

MINIATURE LAMPS

Although the sale of miniature lamps does not fall within the scope of this report, it is interesting to note that mazda miniature lamps have so completely replaced carbon that their sales comprise over 85 per cent of total miniature lamps sold.

DEVELOPMENT

Development work on the incandescent lamp has been principally along the lines of increasing the number of sizes of mazda lamps available, embodying the gas-filled bulb. Lamps of this type will be referred to as mazda C lamps to distinguish them from vacuum lamps. They are now made for multiple service in the following sizes: 100, 200, 300, 400, 500, 750 and 1000. All of these lamps are primarily unit illuminants, that is, it is customary to use them in individual reflectors, and your Committee emphasizes the importance of seeing to it, so far as may be possible, that these lamps are introduced and used as unit illuminants.

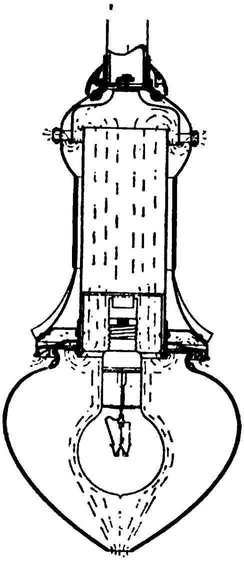
The popularity of lamps embodying the gas filled principle is illustrated by the fact that in the neighborhood of a million were sold during 1914.

Improvements in these lamps have been principally along the line of securing a more uniform product, a result which is naturally obtained with greater experience in their manufacture. The principal change in their design has been to adopt a new line of bulbs in all standard sizes with exception of the low candle-power street series. The new bulbs are pear shaped with extended glass necks, as shown in the illustrations. It is customary to insert a mica disc deflector between the stem and filament of these lamps, thereby deflecting hot gases from the glass seals and base. The usual practice in the design of these lamps is to construct them for but one position of burning, namely, tip-down. Manufacturers are, however, in a position to supply lamps designed for operation in an inverted position (tip-up) but such lamps must be ordered specially for this purpose.

It seems to be very desirable that everyone in a position to make lighting recommendations should standardize on the practice of operating lamps in a pendant position (tip-down). Inasmuch as the adoption of these lamps is usually accompanied by the employment of new fixtures, this will not be a hardship to the customer.

The results obtained from the use of these lamps depend to a large extent on the manner in which they are installed. It is, therefore, very desirable that they be used in fixtures of proper design and in an approved manner. The fixtures should provide proper ventilation and where used outdoors should protect the upper half of the bulb from moisture.

As this report goes to press your committee has had brought to its attention by one of the large manufacturers a gas-filled lamp the bulb of which is made of blue tinted glass designed to screen the mazda C light down to an approximate sunlight. At the time of writing these lamps have not reached the stage of commercial production and your committee is assured by the manufacturers that the lamp will not be widely exploited until it has been satisfactorily developed for commercial use.



VENTILATED CONTAINER ADAPTED FOR ARC LAMP CASING

The lamp having a color value of approximate sunlight will serve for application in a special field. More particular data concerning this development may be available at the time of presentation of this report.

VENTILATION

The National Fire Protection Association has given this subject of ventilation and temperatures consideration with respect to the use of the mazda C lamp for interior use, a sub-committee of that Association having adopted in January last a suggested rule based on conclusions reached from temperature tests made on lamps purchased in the market.

Your Committee, feeling that unnecessary restrictions were included within these recommendations, brought to the attention of the sub-committee of the Electrical Committee of the National Fire Protection Association certain recommendations as a result of which Rule 35 of the National Electric Code as finally recommended by the sub-committee was adopted by the Electrical Committee of the National Board of Fire Underwriters at its twentieth annual meeting, held in New York on March 24, 1915. This rule, which applies particularly to mazda C lamps and which is herewith set forth in full, is considered reasonably satisfactory and is the result of co-operative effort on the part of the Electrical Committee of the National Fire Protection Association, the lamp manufacturers and your Committee.

RULE 35 (NATIONAL ELECTRICAL CODE) GAS FILLED INCANDESCENT LAMPS

A Must be so grouped that not more than 660 watts (nor more than 16 sockets or receptacles) are to be dependent on one cut-out, except that in cases where wiring equal in size to No. 14 B & S gauge is carried directly into keyless sockets or receptacles, the location of which is such as to render unlikely the attachment of flexible cord thereto, the circuits may be so arranged that not more than 1320 watts (or 32 sockets or receptacles) will be dependent on the final cut-out. Where a single socket or receptacle is used on a circuit, the limitation of watts permissible on the final cut-out shall be the maximum capacity for which such socket or receptacle is approved.

B Must not be used in show windows or in other locations where inflammable material is liable to come in contact with lamp equipment, except where used in connection with approved fixtures where temperature of any exposed portion of same does not exceed 200 degrees fahrenheit (93 degrees centigrade).

C Must not be used in connection with medium base sockets or receptacles if of above 200-watts nominal capacity, nor with mogul base sockets or receptacles if of above 1500-watts capacity. Must not if provided with a shade, reflector, fixture or other enclosure above the socket, be used in fibre lined or similar sockets or receptacles of either medium or mogul base types if of above 100-watts.

> D Fixtures within buildings must be wired with conductors of approved slow-burning or asbestos covering where the temperature to which wire is subjected at any point exceeds 120 degrees fahrenheit (49 degrees centigrade). Where fixtures are placed outside of buildings approved rubber-insulated wire is required.

Conforming with the ruling in connection with the 300-watt lamp, this size is now standard with the mogul screw base, and its light center length has been increased to 7 inches to agree with the 400 and 500-watt lamps, making it adaptable to fixtures designed for these latter sizes.

The lamp manufacturers have generally standardized on the distance between the center of light source and contact cap of the base, in order that fixture manufacturers might standardize the design of their fixtures accordingly. The accompanying table (Table 2) gives dimensional data on the present mazda C lamps available for standard lighting circuits.

Bulbs of all street series lamps above 100 candle-power have been changed to pear-shaped (PS) bulbs of the same diameter as the previous straight-side (S) bulbs. (See Figs 3-4-5)

The completeness with which mazda C street series lamps have superseded the old type has resulted in the mazda B (vacuum) street series lamps being withdrawn from the schedule of lamps regularly listed by the manufacturers.

In connection with the replacement of mazda B street series lamps by mazda C, it is interesting to note that this has usually been accomplished by the adoption of the new lamps of higher candle-power. The manufacturers do not regularly list street series lamps of lower than 60 candle-power. It is recommended by the Lamp Committee that wherever new contracts for street lighting are entered into, efforts be made to adopt the higher candle-power lamps, this practice being in keeping with the general tendency to increase the standard of street illumination. The range in candle-power from 60 to 1000 now available for use on street series circuits provides a flexible system of street lighting with a size available to meet all particular requirements of this class of service.

As shown in the following table, the wattage consumption of the 60-cp mazda C lamp is only slightly in excess of the 32

TABLE II

TABLE SHOWING PHYSICAL DIMENSIONS OF MAZDA C LAMPS FOR 105-125-VOLT CIRCUITS

Watts	W P C	Bulb	Diam	Light C L	Overall Length	Base		
100	.80	PS-25	3⅛ in	5 3/16 in	7⅛ in	Medium	Screw	Unskirted
200	.75	PS-30	3¾ “	6 “	8⅜ “	“	“	Skirted
300	.70	PS-35	4⅜ “	7 “	9⅝ “	Mogul	“	Unskirted
400	.70	PS-40	5 “	7 “	10 “	“	“	“
500	.70	PS-40	5 “	7 “	10 “	“	“	“
750	.65	PS-52	6½ “	9½ “	13½ “	“	“	Skirted
1000	.60	PS-52	6½ “	9½ “	13½ “	“	“	“

STREET SERIES MAZDA C LAMPS

C P	Amperes			Bulb	Diam	Overall Length	Light Center Length	Base	
60	5.5	6.6	7.5	S-24½	3 1/16 in	7¼ in	5⅜ in	Mogul	Unskirted
80	5.5	6.6	7.5	S-24½	3 1/16 “	7¼ “	5⅜ “	“	“
100	5.5	6.6	7.5	S-24½	3 1/16 “	7¼ “	5⅜ “	“	“
250	5.5	6.6	7.5	PS-35	4⅜ “	9¾ “	7 “	“	“
400	5.5	6.6	7.5	PS-40	5 “	10 “	7 “	“	“
600	5.5	6.6	7.5	PS-40	5 “	10 “	7 “	“	“
400		15		PS-40	5 “	12½ “	9½	“	Skirted
600		20		PS-40	5 “	12½ “	9½ “	“	“
1000		20		PS-40	5 “	12½ “	9½ “	“	“

and 40-cp lamps of the vacuum mazda B type and this is more than offset by the increase in candle-power and the improved quality of the light.

TABLE SHOWING RELATIVE WATTAGE CONSUMPTION

Candle-power	Mazda B Type Watts	Mazda C Type Watts
32	41.6	31.4
40	48.8	35.2
60	67.2	46.8

This policy has generally been adopted by the larger companies substituting 60-cp lamps of the mazda C type for the 32 and 40-cp mazda B or vacuum lamps previously supplied, while the 100-cp is replacing the 80, the 250, naturally, replacing the 200-cp lamps.

It would seem as though the 60-cp series should be the minimum to be standardized for street lighting.

EFFICIENCY OF THE MAZDA B VACUUM LAMPS

The improvements in the vacuum or mazda B lamps during the last year are noticeable principally in the increased efficiency of these lamps. Since last year's report, this improvement has been in the neighborhood of from 7 to 10 per cent in sizes below 150 watts. Last year it was stated that the practice of introducing chemicals to delay the discoloration of the bulb had been extended to include the 40 and 25-watt sizes. This practice has been still further extended to include 10, 15 and 20-watt

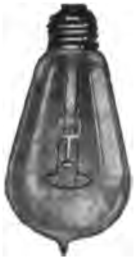


FIG 2—60-WATT MAZDA B
COIL LAMP
S-21 BULB

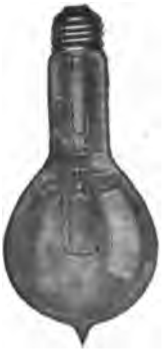


FIG 3—100-WATT MAZDA C
PS-205 BULB

lamps and has permitted the operation of all vacuum lamps at higher efficiencies with improved maintained candle-power.

The table in last year's report, showing changes in efficiency (candle-power per watt), the dates of such change in efficiency, and the date of introduction of the different sizes of mazda B vaccum lamps, is brought up to date of April 1, 1915 (Table III).

An interesting departure from the regular practice of mounting tungsten filaments in vacum lamps is the recent standardization of new style of 25, 40 and 60-watt mazda lamps (Fig 2) wherein the filaments are coiled and mounted in such a manner as to increase the candle-power in vertical directions. These lamps have been developed to meet a certain demand for a lamp of somewhat similar appearance to the mazda C lamp, but of smaller wattage consumption. They have about the same spherical candle-power per watt as the more generally used 25, 40 and 60-watt lamps, although their rated average life is 600 hours as compared with 1000 for the regular type.

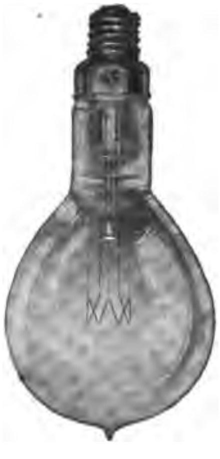


FIG 4—400-500-WATT MAZDA C PS-40 BULB

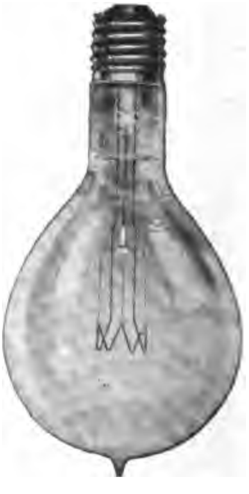


FIG 5—750-1000-WATT MAZDA C PS-52 BULB

NEW TYPES OF LAMPS STANDARDIZED

Since May 1, 1914 a number of new types and sizes of lamps have been announced and standardized by the manufacturers. The following table shows the additions to the standard lamps.

TABLE III

TABLE SHOWING CHANGES IN EFFICIENCY IN CANDLE-POWER PER WATT, AND THE DATE OF INTRODUCTION AND CHANGE IN EFFICIENCY FOR 25-WATT AND EACH LARGER SIZE OF MAZDA B VACUUM AND MAZDA C LAMPS

Size of Lamp in Watts	Oct 1 1907	Oct 1 1908	July 1 1909	Jan 1 1910	July 1 1910	Oct 1 1912	April 1 1913	Jan 1 1914	April 1 1914	June 1 1914	Oct 1 1914	April 1 1915
25		.69	.69	.76	.76	.85	.85	.88	.88	.88	.95	.95
40	.78	.78	.78	.81	.81	.85	.85	.91	.91	.91	.97	.97
60	.78	.78	.78	.85	.85	.86	.88	.93	.93	.93	1.00	1.00
100	.78	.78	.78	.85	.85	.88	.93	.98	.98	.98	1.05	1.25
150			.78	.85	.85	.89	.97	1.11	1.11	1.11	1.11	1.11
200											1.25	1.33
250		.80	.80	.88	.88	1.00	1.00	1.11	1.11	1.11	1.11	1.11
300											1.28	1.43
400					.88	1.00	1.00	1.11	1.11	1.33	1.33	1.43
500					.88	1.00	1.00	1.11	1.11	1.43	1.43	1.43
750									1.54	1.66	1.66	1.54
1000									1.66	1.82	1.82	1.66

Size in Watts	Voltage	Description	Bulb*
300	105-125	Mazda C	PS-35
200	“	“ “	PS-30
100	“	“ “	PS-25
250	“	Mazda stereopticon	G-30
500	“	“ “	G-40
25	“	Coil filament mazda B	S-19
40	“	“ “ “ “	S-19
60	“	“ “ “ “	S-21

STREET SERIES

C P	Ampere	Description	Bulb*
60	5.5	Mazda C	S-24½
60	6.6	“ “	S-24½
60	7.5	“ “	S-24½
80	5.5	“ “	S-24½
100	5.5	“ “	S-24½
100	7.5	“ “	S-24½
250	5.5	“ “	PS-35
400	5.5	“ “	PS-40
400	7.5	“ “	PS-40
600	7.5	“ “	PS-40
400	15.0†	“ “	PS-40

STANDARD VOLTAGE

Your attention is called to the narrowing of the voltage range for standard lighting circuits which now includes voltage from 105 to 125 and 220 to 250. The principal reason for narrowing this range was the small demand for lamps outside of these voltages.

Last year, however, the Committee touched on the fact that manufacturers reported great progress in the ability to produce mazda lamps to actual voltage required, the art of doing this being so far advanced that it would be possible to manufacture all lamps to conform to a standardized voltage.

In connection with the subject of voltage, it is desirable to again emphasize the importance of operating incandescent lamps at the voltage for which they are designed. It will be remembered that this subject was rather fully treated in a paper presented at the 1913 convention, entitled “The Relation of Incandescent Lamps to Lighting Service.”

Recently, central stations have given more attention to this subject and voltage surveys have been made on quite an extensive scale. We are advised that the number of central stations on whose circuits this subject has been investigated totals about 600.

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* Lamps shown in PS bulbs originally standardized with S bulbs of the same diameters

† For use with compensator

In the matter of a standard operating voltage, your committee has been unable to do more than canvass this situation to some extent with the several manufacturing interests. As far as the lamp manufacturers are concerned there is no difficulty in the way of standardization of operating voltage, but, as stated in last year's report, there are important offsetting disadvantages from the viewpoint of other interests.

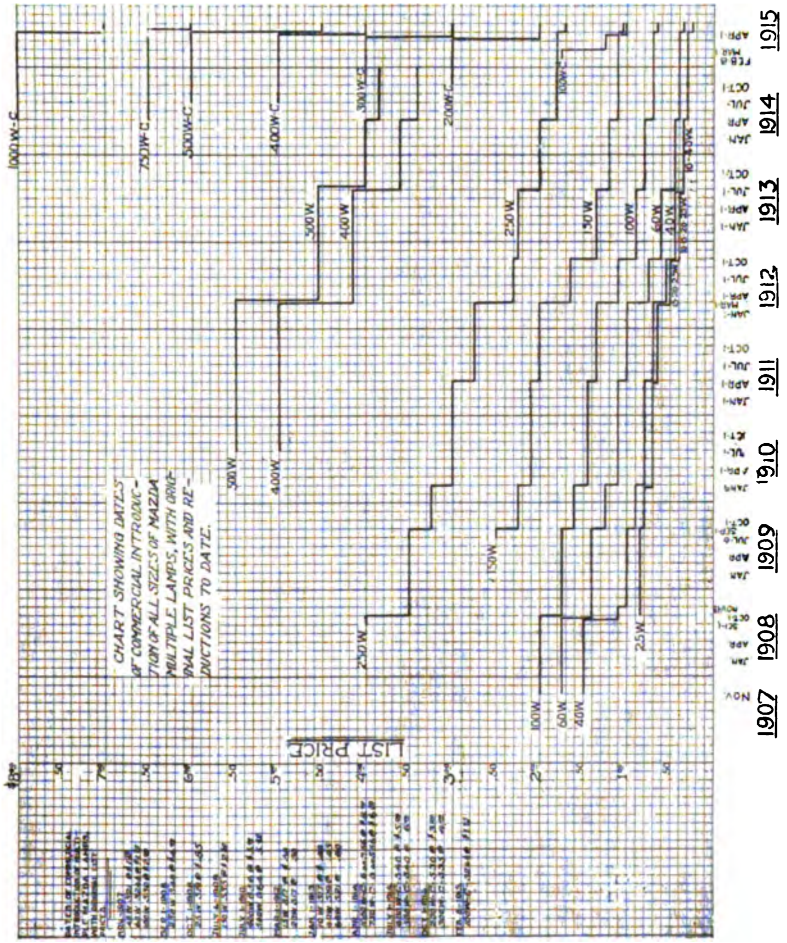


Fig 6

Further consideration and discussion of this subject by the Association might well be had.

PRICES

Since the report made a year ago, reductions in the list prices of mazda lamps have from time to time been announced by the manufacturers.

A chart has been prepared (Fig 6), the study of which will disclose the dates of the commercial introduction of all sizes of mazda lamps, with the original list prices and reductions made thereon at different times, the most recent reduction, which was made effective April 1, 1915, having been communicated directly to the member companies by your Committee in an announcement, as follows:

New York, April 1, 1915.

IMPORTANT ANNOUNCEMENT

Lamp Price Reductions

To the Member Companies

Your Committee desires to inform you that the manufacturers announce, effective as of April 1, 1915, price reductions on practically all sizes of mazda lamps, both multiple and series. On the more regular sizes of multiple lamps the reductions correspond to about ten per cent from the present regular list prices, while on the mazda C multiple or gas-filled lamps, reductions in some cases as large as twenty-five per cent are noted.

The following table shows the new prices on the types and sizes of lamps largely used by the member companies:

MULTIPLE MAZDA B LAMPS

105 to 125 volts

Size of Lamp in Watts	Old List Price	April 1st List Price
10	$ .30	$ .27
15	.30	.27
20	.30	.27
25	.30	.27
40	.30	.27
60	.40	.36
100	.70	.65
150	1.10	1.05
250	1.80	1.70
400	3.40	3.40
500	3.85	3.85

The following table shows the new prices compared with old prices on the 220 to 250-volt mazda lamp:

Size of Lamp in Watts	Efficiency W P C	Bulb	Stand. Packg. Quantity	List Prices	
				Old	Effective April 1st
25	1.20	S-19	100	$ .40	$ .33
40	1.12	"	100	.40	.33
60	1.10	S-21	100	.50	.45
100	1.06	S-30	24	.90	.80
150	1.00	S-35	24	1.25	1.20
250	.95	S-40	12	2.20	2.00

Special attention is called to the prices of the 220 to 250-volt lamps, particularly to the lower wattages, the prices of which are now much closer than heretofore to the prices of the 105 to 125-volt lamps. It would seem that member companies using these higher voltages should take advantage of these lower prices and so far as possible substitute mazda lamps for other types.

A reduction of similar proportions is evident for the low voltage sign lamps and in lamps furnished in round bulbs.

The following changes indicate the new prices for the mazda C multiple or gas-filled lamps in the new standard bulbs recently adopted.

MULTIPLE MAZDA C LAMPS

105 to 125 volts

Size of Lamp in Watts	Old List Price	April 1st List Price
100	$1.25	$1.00
200	3.00	2.00
300	4.00	3.00
400	5.00	4.00
500	6.00	4.50
750	6.50	6.00
1000	8.00	7.00

The price changes in the street series lamps consist of the supplying of the 7.5 ampere group at the same prices as the 6.6 and 5.5 ampere classes. Thus, the prices for similar candle-power sizes in the 5.5, 6.6, and 7.5 ampere groups will be the same as of April 1st.

The only other price changes among the street series lamps are on the lamps of 400, 600 and 1000 candle-power. These changes are as follows:

MAZDA C STREET SERIES LAMPS

Amperes	Candle-power	Old List Price	April 1st List Price
5.5	400	$4.15	$4.00
6.6	400	4.15	4.00
	600	6.50	5.00
7.5	400	4.15	4.00
	600	6.50	5.00
15	400	4.15	4.00
20	600	6.50	5.00
	1000	6.50	6.00

The Lamp Commitee is at the service of member companies for any information desired in connection with the above."

DECREASED COST OF ELECTRIC LIGHT

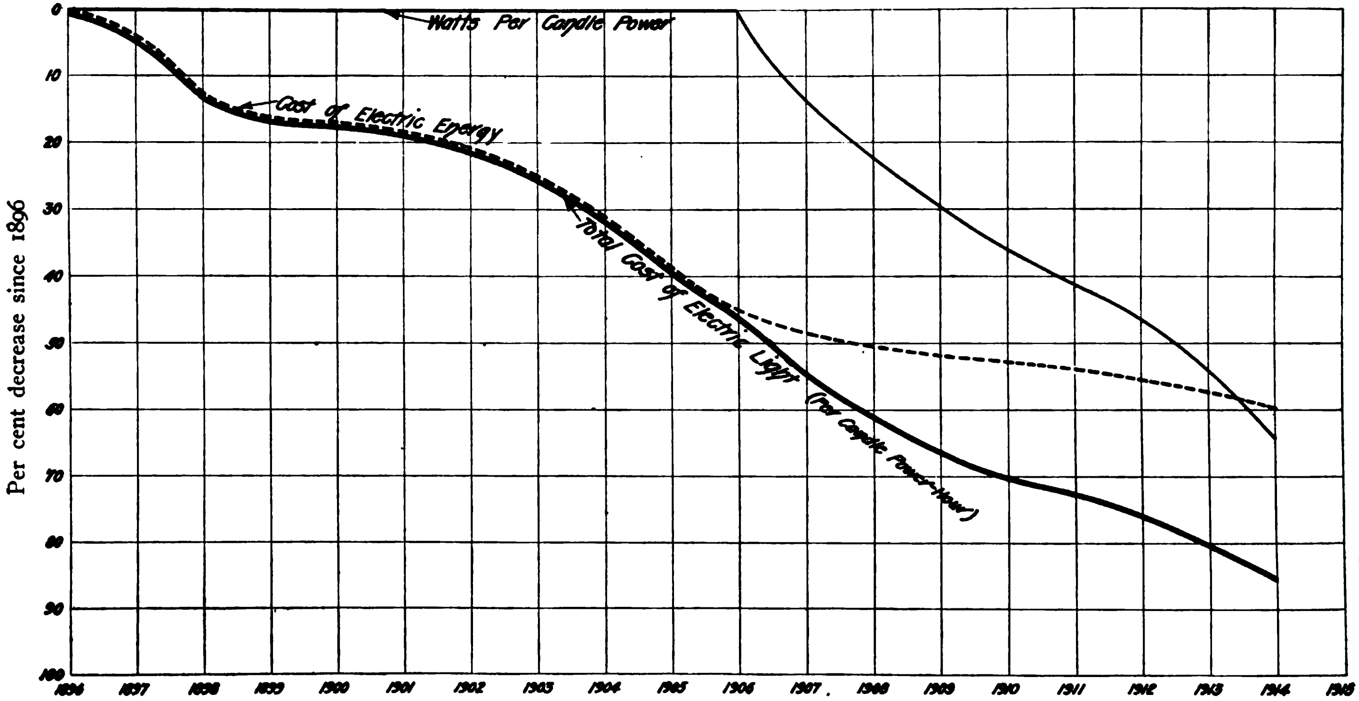


FIG 7

REDUCTION IN COST OF LIGHTING

It may be proper to direct attention to the rapid and consistent reduction in the cost of electric illumination. There are three important factors entering into this cost, namely: the price per kilowatt-hour for current, the price of the lamps, and the efficiency of the lamps.

The first two factors, namely, the cost of current, and the price of lamps, have been reduced year by year, while the lamp efficiencies have been increased, reducing the third factor as an element in the yearly reduction in the cost of light. The reduced cost of electric illumination is in notable contrast with many important commodities entering into the cost of living.

Curves shown in Fig 7, indicating the percentage reduction in maximum rates for current, as well as the decreased watts per candle because of the constantly increasing efficiency of the lighting units, graphically illustrate this point and indicate what has been accomplished over a period of twenty years in lowering the cost of electric illumination. The "Cost of Energy" curve is the average of a number of larger cities in the United States and may be considered representative.

It will be observed that the lowered cost of energy has played the most important part in these reductions.

MUNICIPAL STREET LIGHTING

During the year and more especially since the early fall of 1914, there has been a rather widespread introduction of the mazda C lamp for public street illumination. The use of series mazda C lamps in this field of lighting has materially increased and the multiple lamp in the larger units has in some important centers superseded the various types of arc lighting for this class of service.

Your Committee is unable to present at this time sufficient data as to comparative costs, life and other information with respect to performance for the reason that this type of lamp (particularly the multiple lamp) has not been in general use for a long enough period to make such data representative. It may be stated however that, in general, satisfactory results are being obtained and that there is a steady and consistent improvement in the life and other characteristics of the mazda C lamp for public street lighting.

It would seem that some new fields have presented themselves by the adoption of these types and in some cases member companies have been able to secure additional business in parks and thoroughfares not previously lighted electrically.

Special Fixtures

Considerable experimenting has been carried on by member companies and others with different types of fixtures or containers for the mazda C lamps for street lighting purposes. Several large companies report the successful conversion of the arc-lamp casings into incandescent containers, embodying ventilating features to meet the requirements. More particular reference is made to this subject under "New Fixtures."

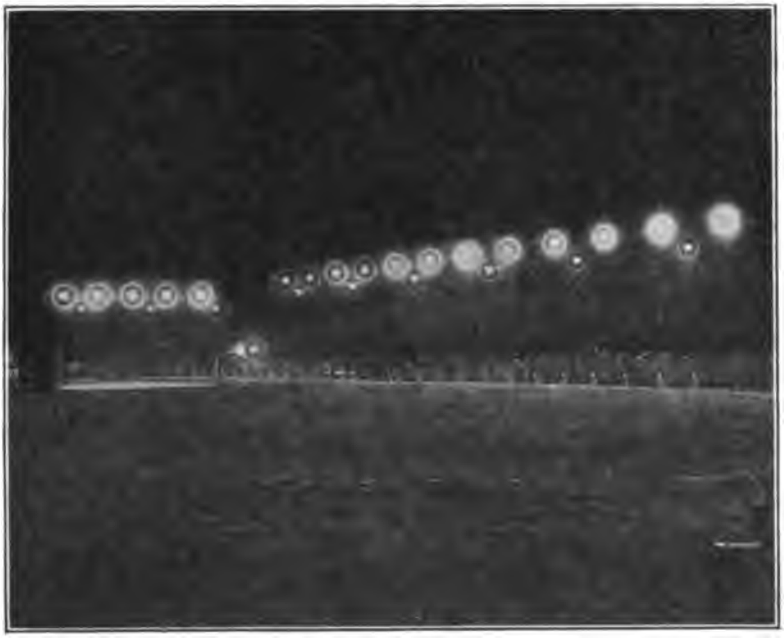
New York City

It may be interesting to report in some detail with respect to the situation in New York City where a very considerable

FIFTH AVENUE (NEW YORK CITY), NORTH FROM 27TH ST
Twin Lamps, 400-watt Mazda C, Replacing Twin D-C Arc Lamps, 450 watts at the Arc

introduction of the mazda C lamp in various sizes has quite recently taken place in substitution of other equipment as well as for new and additional lighting.

The municipal authorities in this city have adopted for street illumination the mazda C lamp. Upwards of 10,000 enclosed carbon and flaming arc lamps have been replaced by an equal number of mazda C lamps in the 300, 400, 500, 750 and 1000-watt multiple types, and the 400-cp series type. This substitution has been on a lamp for lamp basis, the candle-power being determined by the character of the street to be lighted. The wide range in candle-power made available by the several sizes of lamps makes it possible for the city, to its advantage economically, to apply proper lighting units for the several classes of service, as determined by the varying conditions.



Horse Show Arena
22 1000-watt Mazda C Lamps—Angle Type Metal Reflector

The municipal authorities are giving consideration to the possible use of the 200-watt multiple mazda C unit, with proper spacing, for side street illumination.

In general, the types of lamps selected have been on the following basis:

a—For large squares at intersecting streets and junction points	750-watt
b—For important thoroughfares	500-watt
c—For cross-town streets similar to 34th, 42nd and 59th Streets and for tree-lined or parked avenues and avenues or streets with car lines	400-watt
d—For mercantile districts, wholesale district, residence streets and small parks	300-watt

400-CP SERIES MAZDA C ORNAMENTAL POST SPACING 120 FT

Bridges, etc

The use of the mazda C lamp has been extended to the bridges connecting the several boroughs, replacing the multiple arc lamps by 300-watt multiple mazda C lamps to the approximate number of 600. These lamps are divided between those of the bowl frosted type installed with the socket housing having an elongated neck reflector coming well down over the neck of the lamp and without the usual outer globe enclosure, and those in the standard housings. The lamps operating without globe enclosure are the straight-sided pear-shaped type and have withstood climatic conditions, vibration, etc., satisfactorily. A typical installation of this type is the 78 lamps on the 8700-foot structure of the Queensboro Bridge.

Public Building Lighting

The mazda C lamp has also been adopted in New York City for large lighting units in public installations such as armories, drill-halls, pumping stations, ferry houses, etc. The lamps are housed in reflectors or the usual spun metal container, installations varying from 35 lamps in armories to 6 in smaller installations.

Department Store Interior
21 750-watt Mazda C Lamps—Indirect Fixtures

Experience thus far from the lighting point indicates the substitution of the arc lamps as having been satisfactorily accomplished. The elimination of frequent arc lamp maintenance has increased the favor with which the new lamp has been received by those in charge of the buildings.

The total installations in public buildings in Greater New

York at this time is slightly less than 1000 lamps, varying in size from 300 to 1000 watts.

Chicago

The city of Chicago presents another representative installation for street illumination with the mazda C lamp, particularly of the series type. There are now approximately 10,000 of the 600-cp series lamps in service throughout the various sections of the city, a portion of these lamps having replaced the direct-current and 7-ampere a-c arc lamps. It is reported that from 5000 to 10,000 additional lamps will be added to the system during the current year in substitution of the 7-ampere arcs and for further extensions.

OFFICE INTERIOR
400-watt Mazda C Lamps—Semi-Indirect Fixtures

The mazda C lamps are gradually being substituted for the vacuum lamps of lower candle-power installed in connection with the ornamental street lighting system in residential districts.

A number of representative installations of both series and multiple street lighting, as well as commercial applications of the mazda C lamp are herein illustrated.

DEVICE FOR CALCULATING LIFE

Your Committee illustrates herewith (Fig 8) for the information of members operating street lighting, a calculator for determining the life of lamps operating on street lighting schedules under a city contract as devised by one of the member companies.

On the outer edge of the circular indicator is shown progressively the total yearly burning time, in this instance, proportioned for 3980 hours, the moving member or inside scale carrying the monthly calibration.

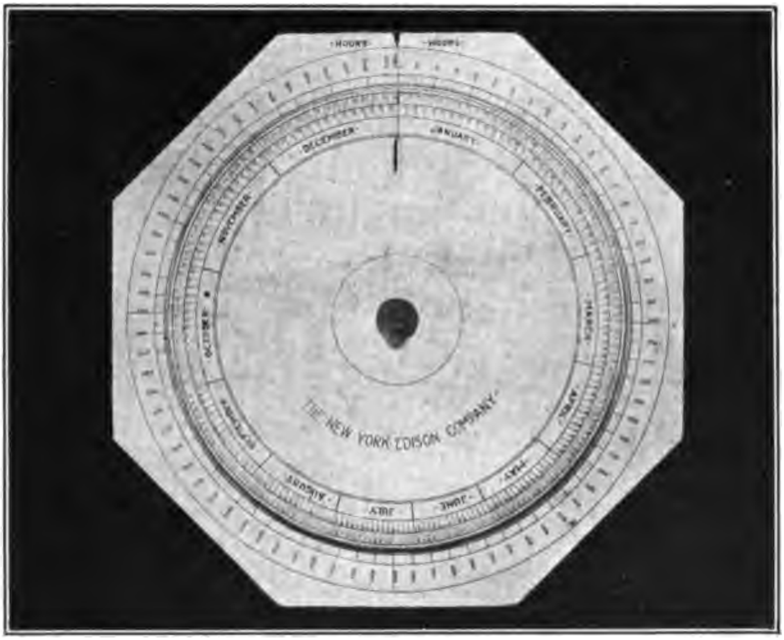


Fig 8—Calculator for Determining Life of Lamps

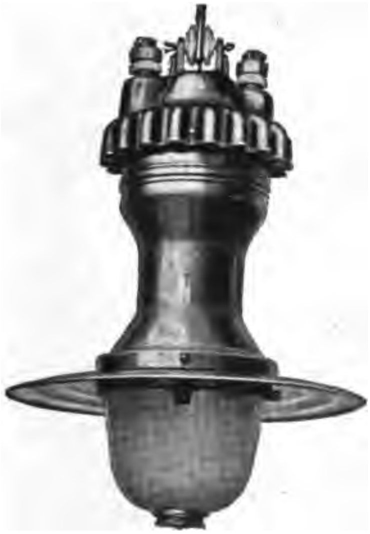
Given the date of any month on which a lamp was placed in service, the elapsed time, i. e., the hours the lamp has been in service on a variable daily street lighting schedule, can be readily ascertained.

The calculations are made to the right of the zero point and, as an illustration, a lamp installed on December 31st and removed March 12th would show a total life of 930 hours.

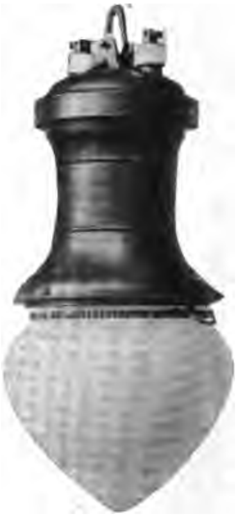
The function of the circular indicator is that of a labor saving device as it makes possible with a minimum amount of labor the determination of the life of the lamps. The advent of the Type C lamps for street lighting makes desirable such a record as the performance of the lamps on an individual basis as well as the record of their average life performance, and particularly is this desirable where more than one size of lamp is in use on any one installation.

**Fixtures for Mazda C Lamps*

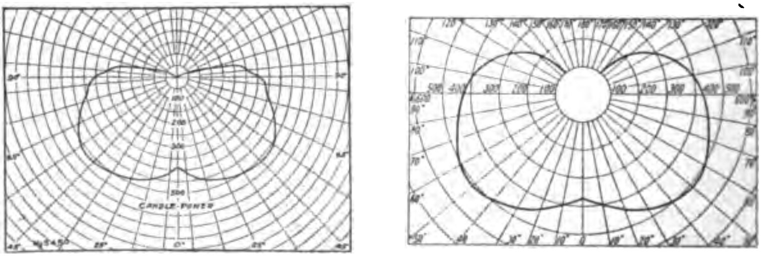
Fixtures are now available for adapting all types and sizes of these lamps to ordinary classes of service. Most of the stand-



Compensator Type Unit With Concentric Reflector and Prismatic Refractor



Without Reflector or Refractor, Complete With Globe



Distribution Curves of 600 cp Mazda Series Lamp ard fixtures are well suited to the purposes for which they are intended. The lower candle-power lamps, both multiple and series, can be used in fixtures similar to those employed for vacuum type lamps, although it is sometimes advisable to provide a higher degree of diffusion for corresponding service and on account of the intrinsic brilliancy of these lamps it is highly desirable—for the larger sizes—that diffusing globes or reflectors be used so as to avoid excessive glare. This is most important when lamps are hung low or in the ordinary fields of vision.

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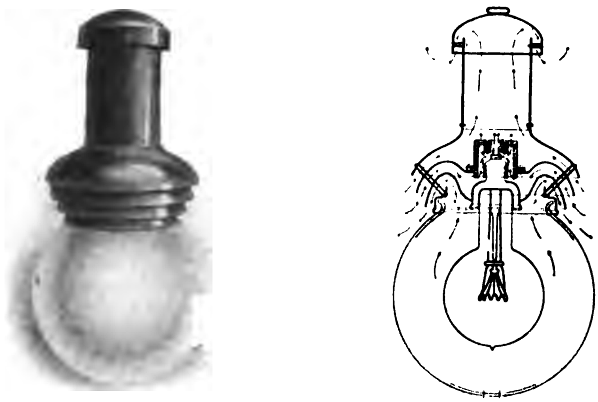
*The Lamp Committee will be glad to furnish detail information concerning any of the fixtures described or illustrated.

The prismatic refractor has been rather extensively applied By changing the relative position of lamp and refractor, the maximum candlepower may be directed at such an angle as to fall half way between units, where it is most needed.



Type of Ventilated Unit for
High Wattage Lamp

The higher power series and multiple lamps have made it necessary to provide new designs of fixtures to accommodate the new characteristics of the lamp. Therefore it seems desirable to outline briefly some of the special fixture features required to insure the best possible service.

Heat

The 750 and 1000-watt lamps being of higher wattage than lamps formerly available naturally generate more heat. While the lamps generate no more heat than the vacuum lamps of corresponding wattage, the convection currents within the lamp bulbs tend to concentrate the heat in the upper part, so that a higher temperature is sometimes found at the lamp base.

It is therefore advisable to avoid using with any of these lamps sockets having wax compounds or other material which is easily affected by temperature. In the case of the higher wattage lamps, or where the socket is enclosed within the fixture, it is desirable to use porcelain sockets without fibre insulation, and to avoid the use of rubber-covered wire at the sockets. In other words the construction should correspond to that of the arc lamps or other high power illuminants.

Fixtures should be ventilated so as to cool the socket and lamp base, as excessive temperature at these points may affect the socket or shorten the life of the lamp. Large, roomy fixtures with good radiating surfaces are advantageous, although not absolutely essential in case proper ventilation is provided. In an enclosed type of pendant fixture it is well to use a combination reflector diaphragm, so arranged as to deflect light upward and at the same time keep the heated air from rising from the bulb and coming in contact with the socket.

Weather Protection

Where fixtures are exposed to the weather it is important that they should be designed so that rain and sleet cannot enter and come in contact with the lamp bulb. Especially in the enclosed fixtures, the upper part of the lamp bulb becomes sufficiently hot to be in danger of cracking if water falls on it. While practically all the outdoor fixtures thus far available will take care of ordinary weather conditions, in order to insure continuity of service it is necessary to select fixtures which will protect the lamps against extreme conditions of severe rain and wind storms to which they are only occasionally subjected. If the fixture is large and provided with good radiating surface, ventilating openings can practically be dispensed with.

Pendant Burning

Wherever practicable, fixtures should provide for burning the lamps in pendant position. While lamps for burning in any position are obtainable, the pendant type has been generally standardized, since it permits the production of better and more reliable lamps.

Fixture and Reflector Equipments

The following list covers the principal types of standard equipments now available. In addition to these a large number of special designs, especially of the ornamental class, are being manufactured by the various fixture houses, and, as before stated, satisfactory fixtures for street lighting are being provided in many instances by the adaptation of the existing arc lamp casings, reconstructing these and installing a container so as to take care of the requirements for proper ventilation, protection from moisture, etc.

(1) Dome and bowl type porcelain enamelled steel reflectors, with or without weather-proof housing. Principal application: industrial lighting.

(2) Angle type porcelain enamelled steel reflectors asymmetrical, with or without weather-proof housing. Principal application: industrial lighting, tennis-court lighting, photo studio lighting.

(3) Semi-indirect diffusing glass reflectors, with plain or ornamental suspensions. Principal applications: lighting stores, offices, drafting rooms, auditoriums and other light-ceiled interiors.

(4) Indirect metal or mirrored glass reflector, with plain or ornamental suspensions. Principal applications: (Same as item 3).

(5) Diffusing globe fixture of various designs, more or less ornamental. Principal applications: direct lighting of interiors where units can be hung high.

(6) Weather-proof diffusing globe fixtures, plain or ornamental, with or without reflectors. Principal applications: building front lighting, amusement park lighting, display lighting, excavation lighting.

(7) Pendant street lighting fixtures for alternating-current series circuits.
  (a) With compensators or transformers for use with high current lamps, 400-cp or above
  (b) Without compensators for operating lamps of 600-cp or less direct on standard series circuits.

  Such fixtures may be equipped with:
    (1) Diffusing globes with or without reflectors
    (2) Refractors with or without reflectors
    (3) Radial wave reflectors.

(8) Pendant street lighting fixtures, for 110-volt a-c or d-c, equipped with:
  (1) Diffusing globes with or without reflectors
  (2) Refractors with or without reflectors
  (3) Radial wave reflectors.

(9) Ornamental pole-top street lighting fixtures with diffusing globes, for:
  (1) A-c series compensator type lamps
  (2) A-c straight series lamps
  (3) A-c or d-c multiple lamps.

The concentrated filament lamps are especially suitable for use with the following equipments:

(1) Small and medium size stereopticon projection lanterns
(2) Small moving picture lanterns
(3) Theatre spot lights
(4) Searchlights
(5) Floodlights
(6) Headlights

*INCANDESCENT ILLUMINANTS—NEW USES

The mazda C lamp has opened up a number of interesting new fields for the use of incandescent illuminants; first, due to the possibility of obtaining a highly concentrated light source of high intensity and, second, to the possibility of obtaining higher candle-powers than previously available with improved quality of light.

Under the first development there have been designed special focusing types (concentrated filament) of mazda C lamps for use in stereopticons, for the illumination of billboards and building fronts, the operation of small motion-picture machines and in stereopticons. The most interesting of these fields, from a central station point of view, should be the flood lighting of building front and billboards, which have excellent load-factors and represent a very considerable load when properly developed.

In the fields of portrait and commercial photography, as well as in motion picture studio lighting, the new lamps are making rapid headway.

The regular high wattage high candle-power mazda C lamps are being used very successfully for the illumination of athletic events at night. For example, tennis courts are now very efficiently lighted, while court golf, trap shooting and other events are taking place successfully at night.

The higher wattage lamps are especially adaptable for the illumination of all large interiors where the lamps are hung high, and for use in indirect and semi-indirect fixtures where pre-

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*Vol. XVIII, No. 4 (April, 1915) General Electric Review

*Vol. X, No. 2 (1915) Transactions of Illuminating Engineering Society viously the high intensity of the light source required limited somewhat the use of this equipment.

Question Box

Believing that the *Question Box* forms an important part of the activities of the Association, and in order that this Committee might do its part in contributing to its success and its general helpfulness to the membership, the work of securing authoritative and reliable answers to questions propounded on the subject of illuminating engineering and to other questions concerning the lamp business was undertaken by a member of the committee appointed for that purpose. In this way questions and answers have been secured and submitted to the *Question Box* Editor.

As a matter of interest a sample question, and the answer thereto are quoted:

> Q. Why is nitrogen placed in the new type C lamp. How does it increase the efficiency of the lamp.
>
> A. Nitrogen in a mazda C lamp has two effects:
>
> First, it makes a pressure in the bulb—a gas pressure, similar to steam pressure in a boiler. This pressure raises the evaporating or boiling temperature of tungsten, just as pressure in a boiler raises the boiling temperature of water. As boiling or evaporating is the cause of the wasting away of the tungsten filament, the pressure of the nitrogen permits the operation of the filament at a much higher temperature and higher efficiency than is possible in a vacuum, the rate of evaporation being the same in both cases.
>
> Second, the nitrogen conducts heat away from the filament; this cools the filament—wastes energy—and this effect of nitrogen is bad.
>
> The first effect of nitrogen, however, is so great that it overcomes the bad effect, and has enough good left to its credit to produce the great improvement realized in mazda C lamps.

It was thought that this answer was simple, direct and furnished the information desired.

Your committee believes this activity might well be broadened to the benefit of the membership.

Company Lamp Policy

It will be remembered that last year there was included within the report a presentation by the Commercial Section—acting as a sub-Lamp Committee—covering a careful canvass among member companies on the subject of central station policy in the matter of incandescent lamps.

This inquiry, according to the report, brought out strongly the consensus of opinion that central station companies should and for the most part do continue to maintain a close supervision over the lamp situation.

On or about August 1, 1914, a number of member companies, notably Chicago, Boston, Philadelphia, New York, etc., announced the inclusion within the free renewal list of the 60-watt mazda B lamp, the smallest size previously included being the 100-watt.

There have been some changes during the past year—additional companies adopting a free renewal policy and others including certain sizes of mazda lamps, generally speaking, not below the 60-watt size.

With the advent of the improved mazda C lamp and the lower prices, some companies have included within the free renewal list this type of lamp in the larger sizes only and more particularly for outdoor illumination, in connection with a complete lighting unit, lamp, fixture, outrigger, etc. In some cases member companies give the customer the option in the larger sizes of lamps of receiving either the mazda B or mazda C.

An interesting development with respect to lamp policy is reported with reference to New York City by The New York Edison and The United Electric Light and Power companies. These companies in announcing a new and lower rate schedule, effective May 1st, have excluded the former practice of supplying first installation and renewal of the company's standard incandescent lamps within the rate.

Although the former statutory rate of 10 cents per kilowatt-hour did not require the local companies to furnish lamps, it had been the practice to supply the first installation and renewal of incandescent lamps, including the mazda B type of 60 watt and larger. Under the new rate which became effective May 1, 1915, the supply of lamps is specifically excluded. The companies announce, however, that in order to maintain for the protection of the customer as large a measure of supervision over the local lamp situation as possible, they will on request continue to supply renewals at a flat charge of ½ cent per kw-hr, or the customers may obtain from the companies standard types of lamps at the lowest prices.

It would seem that by this policy of continuing the sale and, where desired by the customer, the renewal of lamps at a very low figure, the companies are thereby recognizing the importance of securing for the customer lamps of the highest quality and efficiency at the lowest practicable cost. It is believed that under this policy customers will continue to a large extent to avail themselves of the company's lamp facilities, which will be maintained at the highest standard, including automobile delivery and periodic renewals, and that by this method the customers will be saved the considerable inconvenience of purchasing at retail in the open market from time to time and only as immediate emergency may require, possibly obtaining lamps of inferior quality.

Inferior Lamps

Inferior lamps of tungsten filament, both of the vacuum and gas-filled types, are making their appearance on the market in increasing numbers. The customer has little or no protection, other than through the co-operation of the central station company, against the manufacturer or agent handling inferior lamps and this fact would seem to emphasize the need for most careful attention to the incandescent lamp situation on the part of the member companies.

It is possible for the central station to supervise the supply of lamps to customers in such a way that they may be assured of obtaining only good and properly rated lamps. Members are accomplishing this successfully by methods which range from the sale of lamps at list prices under such vigorous merchandising activity that practically all customers purchase lamps from the central station, to the other extreme of free lamp renewals as a part of the lighting service. Your Committee does not presume to indicate what the best means may be as local conditions have much to do with the situation, but it is urged that each member company see to it that proper supervision should be had, and that so far as possible, the central station company should see that the highest grade of lamps obtainable be made available to the customer and at a reasonable price, so that the lamps supplied are in size, quality and rating, those which best serve the mutual interests of the customer and the central station.

Arc Lamp Development

With the co-operation of the Street Lighting Committee it was possible to present at the convention last year a comprehensive exhibit of large illuminants including practically every type in present or prospective use. (See Transactions 1914 Commercial Section, pages 137 and 154). Since that time developments have been confined to improvement of types then available or announced rather than to the production of new illuminants. Among arc lamps the principal development has been the perfection of the higher efficiency magnetite electrodes and the provision of a new 5-ampere system to supplement the former 4 and 6.5-ampere systems. This advance in efficiency of the magnetite lamp is roughly of the same order as the advance in efficiency of the Type C over the Type B or vacuum mazda lamp.

CONCLUSION

It is customary each year to record the Committee's appreciation of the assistance rendered in carrying on the work through the year and in the preparation of the annual report. During the past year the Committee has received valuable aid from many sources and takes this opportunity of expressing its great appreciation to all those who have so aided in the work, especially to Mr John W Lieb, Chairman of the Lamp Committee of the Association of Edison Illuminating Companies, to Mr Preston S Millar, of the Electrical Testing Laboratories, and to the lamp manufacturers, who have put at the Committee's disposal throughout the year in most generous manner their facilities and information concerning the development of the incandescent lamp.

Respectfully submitted,

FRANK W SMITH, *Chairman*
WALTER CARY
W W FREEMAN
H B GEAR
M C GILMAN
G C HOLBERTON
W H JOHNSON
G F MORRISON
F S TERRY

APPENDIX

Articles published during 1914-1915 in the Association BULLETIN under the auspices of the Lamp Committee are reproduced herewith for the information of members.

A REVIEW OF THE 1914 LAMP COMMITTEE REPORT

(September, 1914)

At the request of Mr. Frank W. Smith, chairman of the Lamp Committee, the BULLETIN publishes herewith, as fully as space allows, a review of the recent Lamp Committee report appearing in the *General Electric Review,* by Mr. G. F. Morrison, a member of the Committee.

The Lamp Committee's report, which was read at the Philadelphia convention was, because of its historical data and comprehensive review of the present situation, undoubtedly the most interesting report on this subject yet rendered at conventions of the Association.

The manufacture and sale of incandescent lamps have grown to such proportions, and changes have taken place so rapidly that a review of this report will be of vital interest to all persons concerned in electrical development.

The aggregate sales of domestic incandescent lamps for 1913, exclusive of miniature lamps, was slightly in excess of 100,000,000 lamps. This is an increase of 59 per cent over the total sales for 1907; 20.09 per cent for 1909, 12.40 per cent for 1910, 8.5 per cent for 1911, 5.87 per cent for 1912 and 11 per cent for the year 1913, which latter year shows, therefore, a marked increase in percentage over the two preceding years.

During 1913 the changes in the relative demands for the various classes (carbon, gem, tantalum and mazda) have been most pronounced. The tantalum lamp, for example, has practically gone out of existence.

The gem or metalized-filament lamp has fallen off slightly in the past year in percentage probably due to the fact that it was pushed so aggressively by lighting companies in place of the carbon lamp the year before. The increase in mazda lamp business during 1913 has been very marked, approximately 60 per cent, the consumption of this lamp exceeding that of all other lamps combined.

Analyzing the sale of mazda lamps by sizes, it is interesting to note that the 25-watt embraces 29 per cent of the total mazda lamp business: the 40-watt, 27 per cent and the 60-watt, 15 per cent. In street series lamps we find that the 60-cp lamp is the most popular.

The ability of the manufacturer to turn out lamps accurately to a predetermined voltage and efficiency due to the improved methods brought about by drawn wire of exact sizes, makes important the introducing of lamps of the proper size and correct voltage on the lines on which they are to be operated, especially so in view of the rapid increase in the efficiency of mazda lamps.

Due to the general improvement in quality and the ability to make mazda lamps for an exact voltage, a change of no little importance has been the abandonment of the three-voltage label and the substitution of a label bearing a single voltage. The efficiency of lamps at the voltage shown on the label corresponds with the high operating efficiency of the three-voltage label. Marked improvements in general lighting should result from this change by having lamps more uniform and operated at a better efficiency.

During the year the quality of mazda lamps has been greatly improved in several ways. First, by improving the quality of the tungsten wire the filaments have been made stronger, with the result of delaying the condition of brittleness to a much later period in the life of the lamp; second, an improvement has been made in supporting the filament by changing from heavy rigid supports to light semi-flexible or flexible supports, which flexibility protects the filament throughout its life and makes the lamp much stronger; third, the introduction of chemicals into the lamp to prevent or delay the appearance of blackening and to improve the efficiency at which the lamp operates. This practice has been extended to the 25 and 40-watt lamps, and has been greatly improved in the 60 to 500-watt lamps.

A number of the larger lighting companies have inaugurated with success during the past year the policy of including within the free renewal list the 100-watt and larger sizes of mazda lamps. This important step was first taken by some of the companies on August 1, 1913, when mazda lamps in sizes of 100 watts and larger were included, and quite recently, or about May 1st, the free renewal privilege was extended to the 60-watt lamp. It is recommended that lighting companies continue a liberal policy in furnishing lamps of the mazda type on free renewal basis and extending this privilege to include other sizes as rapidly as the reduction in price and improvement in quality of the lamps may make possible.

The policy of the central-station companies in maintaining a close supervision over the lamp situation is practically unanimous and they are of one opinion as to the advisability of continuing it. This policy aims to maintain a high standard of illumination, and insure satisfactory performance of lamps, both as to amount and color of light and lamp life. This is accomplished by supplying customers with the best lamps on the market, rather than leaving them to obtain them under conditions which would less surely safeguard lamp efficiency and life. This, in turn, protects the legitimate dealer in his lamp transactions with other users of incandescent lamps.

While there is an ever-increasing tendency in the direction of introducing mazda lamps, and the adoption of a broad and liberal policy on the part of the central station, the movement to popularize modern lighting units should be universal throughout the country, and this policy should be continued and augmented wherever possible by central-station companies to encourage the use and adoption of the mazda lamps by its customers.

INCANDESCENT LAMP DATA

(December, 1914)

As reported in the October BULLETIN, among other matters to which the Lamp Committee is giving consideration, are two, namely, the question of a possible uniform voltage, and the rapid falling off in the demand and production of gem (metalized-filament) lamps.

The former subject was considered at the meeting of the Manufacturers' Club in Hot Springs, and the Lamp Committee will give further consideration of this subject, Mr. F. S. Terry having been appointed chairman of a special sub-committee to report on this phase of the lamp situation.

On the question of metalized-filament lamp production, the committee has sent to all member companies a circular letter which is herewith reproduced in full.

The subject is particularly called to the attention of the member companies, and the point made in the concluding paragraph of the circular is emphasized as important, the Lamp Committee desiring to act as a service bureau for the member companies, by whom this service should be taken advantage of fully.

To THE MEMBER COMPANIES:

The report of the Lamp Committee presented before the 37th Convention in Philadelphia in June last chronicled the large increase in the use of mazda lamps with a corresponding decrease in the use of gem (metalized-filament) lamps, and prophesied a larger and more extended change in this direction in the near future.

The Lamp Committee at this time desires to call attention to the fact that the actual change during the past few months has largely exceeded the Committee's anticipations. The demand for gem (metalized-filament) lamps now made upon the manufacturers is spasmodic and uncertain, with a constantly diminishing quantity.

In view of this uncertainty it is impossible for the manufacturers to carry a stock to meet such a demand without being confronted with the possibility of at some time scrapping a large number of lamps. The manufacturers report extreme difficulty in operating the metalized factories to meet this irregular demand on an economical basis, it being necessary to continually reduce and increase the force as the demand fluctuates, which means lower general efficiency of the force.

The manufacturers anticipate that the production of the metalized-filament lamps is very apt to become a "manufacture-to-order" business. The necessity is therefore pointed out for member companies to anticipate their demands for this type of lamp and to give prompt word to the manufacturers as to their probable requirements monthly for the next eight to twelve months. In the absence of such information there is apt to be an *increase in the cost* of production and delay in delivery. In view of the fact that the central-station companies require a range of voltages, each company having originally been assigned a lamp voltage so as to equalize the curve of voltage demand and the curve of voltage production, if the reasonable parity of voltage production and demand be not maintained, it will be necessary to artificially "mark up" or "mark down" the voltage to fill orders. Any considerable irregular and uncertain relation of voltage production and demand will result in ***increased cost.***

The present largely restricted use of gem (metalized-filament) lamps and the fact that the larger percentage of such lamps now used are at the common voltage centers, 105, 110, 112 and 120 volts, coupled with the inability to manufacture more than 50 per cent of each lot to a given voltage, makes it difficult, if not impossible, to retain the present limits of candle power and wattage and dispose of lamps of off-center voltages.

It is suggested that you make known as soon as possible your estimated requirements for metalized-filament lamps as much in advance as possible, in order that the manufacturers may adjust their facilities to the best advantage of the member companies. In this connection your committee again emphasizes the necessity of a broad and liberal policy with respect to the introduction of the mazda lamp. This policy should be followed wherever the local conditions make it possible, in order to encourage the use and adoption of the mazda lamp.

It is the desire of your Committee to be of service to the member companies in this or in any other matter that has to do with the lamp situation, and you are urged to take advantage of the Committee's facilities for providing prompt and up-to-date information on the subject.

TEMPERATURE OF TYPE C LAMPS

(January, 1915)

Much has been written and said concerning the question of temperatures reached by the new gas-filled or type C lamps. It is believed that the conditions resulting from the use of these lamps should be generally understood.

While there is no question that the temperatures reached by the new lamps are higher than those which have been common within the past few years for the vacuum metallic-filament lamps, we believe that up to the present moment no actual temperature tests have been made outside of a preliminary investigation now being conducted by the lamp manufacturers, the results of which have served, in part, as a basis for the present comment. No one who is interested in the extension of electric lighting service or who is anxious to secure for himself the benefit of the recent lamp improvments, wishes the actual fire hazard of any lighting installation increased, but at the same time all want to see any necessary precautionary rulings made on a reasonable basis. Electrical inspectors who have prohibited the use of the new lamps altogether in certain cases are evidently working on a "Safety First" principle, and it is quite probable that they have taken ultra-conservative action pending official recommendations which undoubtedly will be made as a result of careful investigations.

In a confined space the temperature rise will depend upon the total quantity of electrical energy dissipated, and under such circumstances a

500-watt gas-filled lamp would be on a par with a 500-watt vacuum lamp. The only possible trouble that might arise would be through materially increasing the total wattage by the use of the new lamps which are now available in sizes larger than were heretofore regularly listed. As more light is obtained per watt from the new lamps than from the old, it would seem reasonable that there should be no possibility of any trouble from this source especially as long as the total wattage of an installation is not materially increased.

Due to the conduction loss through the gas surrounding the filament, gas-filled lamps operate at a higher temperature than the vacuum, metallic-filament lamps. It is believed, however, that the temperatures reached by the bulbs of many of the old carbon lamps, especially after they had become badly blackened, were often fully as high as those ordinarily reached by the gas-filled lamps. The concentration of heat at the lamp might, under certain conditions, reach a point where it would constitute a possible fire risk either through proximity of the lamp to surrounding inflammable material, or through the bulb breaking and dropping on such material. In using the new lamps it would seem desirable, therefore, to see that they are kept well away from any easily ignitable material, and, perhaps, as a general rule, placed not nearer than one foot to the ceiling. The ordinary reflectors or enclosing globes generally used with the new lamps decrease materially any possibility of direct contact with the lamp itself. As to the bulb breaking and setting fire to inflammable goods, there seems to be a very remote possibility of this causing any actual trouble, because a lamp would very rarely break while burning (without some external cause) in such a way that part of the bulb would actually fall; and if the lamps were broken by some external action the fact would generally be known at once.

The specific heat of glass is low, and the total amount of heat contained in the bulb of a lamp even at the highest operating temperature would be quickly dissipated, hence it is believed that bulb breakage would hardly constitute a fire hazard to any appreciable degree.

The Lamp Committee would be glad to advise any member company on this question of temperature, having in mind some valuable data with respect to investigations of temperatures of wires, etc.

STATUS OF THE IMPROVED TYPE MAZDA STREET SERIES LAMPS

(March, 1915)

The gas-filled type of mazda street series lamps mentioned in the Lamp Committee's report read at the last convention, has now been on the market for over a year. While it is true that the majority of central stations where series circuits are available have taken advantage of its improved quality, a short review of its characteristics and the opportunities for its still further use may be of interest.

These lamps are listed by the manufacturers in 60, 80, 100, 250 and 400-cp in 5.5, 6.6 and 7.5 amp, with the addition of a 600-cp lamp in the last two current strengths.

The most notable feature of these new lamps is their improved efficiency. For example, a 60-cp lamp of this new construction consumes about the same energy as a 40-cp lamp of the old construction. While at first sight it might seem that this improvement would be most important in connection with the saving of current generated, the new lamps are more valuable to the central station from the increase which they provide in the capacity of existing apparatus. This enlargement in candle-power capacity of lighting equipment coincides with the growth of communities and, fortunately, comes along at a time when we find a general movement throughout the country for improvement in street lighting conditions.

Although the manufacture of 32 and 40-cp lamps of the improved type of construction is possible, they are not regularly listed; and it is recommend that central stations in changing over to the new type of lamps replace the lower candle-power lamps (32 and 40) with lamps of 60-cp, inasmuch as the wattage consumption of the later lamp is only slightly in excess of those of lower candle-power, as shown in the following table, which excess is more than offset by the increase in candle-power and improved quality of light.

TABLE SHOWING RELATIVE WATTAGE CONSUMPTION

Candle-power	Old Type (watts)	New Type (watts)
32..............	41.6	31.4
40..............	48.8	35.2
60..............	67.2	46.8

This policy has been rather generally adopted by the larger companies, substituting 60-cp lamps for the 32 and 40-cp vacuum lamps previously supplied, while the 100 is replacing the 80, and the 250, naturally, replacing the 200-cp lamps.

It would seem as though the 60-cp lamp should be the minimum candle-power to be standardized for street lighting.

It is estimated that to date upwards of 300,000 lamps of this new construction have been successfully used for street lighting throughout the United States. Of the candle-power sizes listed by the manufacturers in the new construction, probably 70 to 80 per cent of the orders received are for this latter type.

These new lamps have been in service sufficiently long to remove any doubt on the part of the skeptical as to the excellent life performance to be expected.

Very nearly as important as the improvement in efficiency which they provide is their interesting characteristic by which the bulbs of these non-vacuum street series lamps remain clean throughout the total life of the lamp. This admirable feature provides a lamp which automatically retires from service before its candle-power has depreciated beyond the useful point. For this reason the duties of the patrolmen are considerably lightened, inasmuch as they are no longer required to exercise any judgment with respect to replacing blackened lamps, but care only for the occasional renewing of a burn-out.

In addition to the improvement in efficiency brought about, the new construction has been valuable in making possible the extension in the range of candle-powers. The street series incandescent lamp systems now have a flexibility of sizes ranging up to 1000 candle-power, making it possible for the incandescent lamp to meet all the varied requirements of individual locations met with in the lighting of a city. It provides lamps of suitable candle-power sizes ranging from those for "by-ways" to those for "white-ways," all adapted for use on the same type of circuits.

MULTIPLE MAZDA C LAMPS

(April, 1915)

As the result of research, investigation and development of mazda C multiple lamps the manufacturers announce the adoption of a new standard of construction, which is expected to eliminate very largely early defects found among such lamps.

Perhaps the most important change consists in the adoption of a bulb which incorporates the good features of both the round and straight side types used heretofore, together with long narrow necks enclosed by mica discs, thereby keeping the upper and base portions of the lamp relatively cool.

The multiple mazda C lamps now on the market are of the 100, 200, 300, 400, 500, 750 and 1000 watt sizes in the standard voltage range, 105 to 125 volts. We have every reason to regard these lamps today as a well established line of proved quality.

Data covering these lamps are given in Table 1. Figs 1, 2 and 3 illustrate the general construction of several important lamps of this line.

TABLE I

Volts	Watts	WPC	Bulb	Base	Diam.	Overall Length	Light Center Length	Standard Package Quantity
105-125	100	0.80	PS-25	Medium screw	3⅛ in.	7⅛ in.	5³⁄₁₆ in.	24
"	200	0.75	PS-30	" " Skt.	3¾ "	8⅜ "	6 "	24
"	300	0.70	PS-35	Mogul "	4⅜ "	9¼ "	7 "	24
"	400	0.70	PS-40	" "	5 "	10 "	7 "	12
"	500	0.70	PS-40	" "	5 "	10 "	7 "	12
"	750	0.65	PS-52	" " Skt.	6½ "	13¼ "	9½ "	8
"	1000	0.60	PS-52	" " "	6½ "	13¼ "	9½ "	8

It is important to note that the dimensions of the new standard line of lamps are in each instance the same or slightly smaller than those used heretofore and therefore all of the fixtures and equipment now used with these lamps can be used without change with the lamps of the new bulb designs.

The 300 watt lamp will hereafter be regularly made with the mogul screw base. The underwriters have recommended that the medium screw socket should not be used for lamps above 200 watts. This change of lamp construction will assist in putting the new ruling into effect. The light center length of the 300 watt lamp has been made the same as that of the 400 and 500 watt sizes so that one type of fixtures can be used with all three sizes. The 750 and 1000 watt lamps also have the same physical dimensions, which permits one style of fixture to accommodate either.

Perhaps the most important feature in connection with the new lines of lamps is that lamps of 200 watts or over are designed to burn only in a vertical position, tip downward; this construction permitting a material improvement in the quality of the lamp over that which it would be possible to attain if a design were to be attempted which would permit them to be burned in any position.

The construction of the 100 watt lamp is at present not sufficiently standardized to outline all of the positions in which it may operate satisfactorily, but it is recommended that if such lamps are to be operated in any other position than the vertical, the suitability of the present lamps for other than vertical burning be discussed with the supplying manufacturer before installation.

One characteristic of the multiple mazda C lamp of 200 watts and above as at present constructed is that it will burn most satisfactorily in a vertical, tip downward, position but satisfactory operation can be expected of these lamps when removed from the vertical not more than 15 to 25 degrees, when operated in a tip downward position. Member companies desiring multiple mazda C lamps for tip upward burning may secure them without additional cost; such lamps being built of special design by the manufacturers.

Particular attention is being devoted to the photometering and rating of these lamps by the manufacturers, who are using as a basis of design data based on specific luminous output and comparative filament temperatures. Whether are not the mean horizontal candle-power rating now used will prove sufficiently indicative of the luminous output of such lamps to warrant its continued use, or whether the mean spherical basis of rating will be employed, is still doubtful.

CHAIRMAN BURNETT: The Committee of which Mr. Frank Smith is chairman, has devoted a great deal of time and energy to this subject, and it must be pleasing to you to realize as a result of hearing this splendid lamp report, the tremendous work that the Committee has done. Mr. Smith and his associates on the Committee have been sitting in with the Edison Association Lamp Committee, and have co-operated fully with Mr. Lieb of the Edison Association Committee. Mr. Lieb has given a great deal of time and attention to the question of lamp development, and has taken a most advanced stand for a period of years on the subject. Under date of June 3rd he wrote as follows to the chairman:

"Dear Mr. Smith:

"I greatly appreciate your courtesy in sending me an advance copy of the report of your Committee to be presented at the San Francisco Convention of the Association. I have read the report with great interest and desire to congratulate your Committee on giving a most interesting review of the lamp situation.

"Your report refers to the recent development of an incandescent lamp having a color value closely approximating daylight. We have had some of these lamps under test in the show window of a prominent department store in this city and some interesting advance data have been obtained.

"I am asking Mr. C. L. Law, Illuminating Engineer of this Company, who expects to take part in the discussion of the report of your Committee, to present the data on the floor of the Convention."

The report will now be discussed and I shall call on Mr. Law of the New York Edison Company.

DISCUSSION

MR. CLARENCE L. LAW, New York City: Under the heading of development the Lamp Committee has made mention of the fact that one of the large manufacturing companies is about to produce a Type C lamp the color of which closely approximates daylight.

In order to determine just what results we may hope to obtain from this lamp, an installation was placed in a show window in one of the large department stores in New York City. The installation consisted of fifteen 100-watt, Type C, 120-volt blue lamps, and was placed for the purpose of perhaps making a novelty of the window rather than to increase the illumination.

Photometer tests were made to obtain foot-candle readings and to compare the installation with the same number of mazda B lamps of equal rated voltage. The results obtained show that the mazda B lamp produces approximately 14, 20 and 29 per cent on a horizontal plane, on the floor, two, and four feet above the floor respectively. This would indicate that the B lamp of the latest catalogue rating produces from 20 to 25 per cent more illumination on a horizontal plane than the C lamp of the same voltage in a blue globe. Both lamps were employed in the same reflector and tests showed that the lamps were subjected to substantially the same loss by absorption in the reflector.

The rating of the C lamps could not be verified, but were furnished by the manufacturers for this particular service. These very limited tests seem to indicate that the new lamp is destined for a service that is confined to a special field. Whether or not the extra cost of the lamp, its low efficiency and apparently short life and limited application, will compensate for the novelty of the installation, is open to question.

We have collected no data that would indicate that the C lamp in a blue bulb has any superiority over the C lamp when used in conjunction with a filter. The advantage seems to lie with the plain lamp, as it can be adapted for the use of any color merely by changing screen or filter.

The manufacturers, however, are to be complimented on the result of their endeavors in this connection. The perfection of this lamp is a further indication of the flexibility of the incandescent lamp, and although its use may be limited it serves to broaden the field of application of a commodity of the central station industry.

As these new blue bulb lamps were not available and due to the short period at our disposal before the presentation of the report, a more careful analysis could not be made.

I have here three auto-chrome slides which I have made of the window, one with a blue lamp, one with white, and one with blue and white lamps staggered.

MR. JOHN W. HOWELL, Harrison, N. J.: I hope you all appreciate this report. It embodies a great deal of work, and it seems too bad to read it as quickly as it has been read, and to consider it as lightly as it is being considered. I hope every one of you will carry a copy of the report home and keep it where you can get at it, and I think every member should have at least one copy of this report for reference, because it contains a great deal of information compiled so as to be readily accessible for quick reference.

As the report states, the chief development work of the year has been the mazda C lamp. That development is well illustrated in the lighting of the streets of New York City. There are 10 000 mazda C lamps now in use in the streets of New York. When the city was considering the adoption of this lamp a trial installation was made, and the effect of the lighting was considered very good. At that time, however, the lamps were not well developed, and the life which the lamp gave was less than half of what we represented it would be. In spite of that fact, the lamps were adopted and at the present time are in actual service, showing a life considerably in excess of the guaranteed life of the lamps.

I would like to refer for a moment to the curve on page 266 of the report. This is a curve showing the reduction in cost of light, and in the text it is stated that three elements enter into it, the price of the current, the price of the lamp, and efficiency of the lamp. And yet, the curve from 1896 to 1906 gives no credit whatever to the lamp for any reduction in the cost of the electric light, while the price of the lamp, which is stated to be one of the elements, was reduced considerably during those ten years. There is still another way in which the lamp helped to decrease the cost of electric lighting during the ten years, and that is in its increase in life, although its efficiency was not changed. During the ten years the efficiency of the old carbon filament was more than doubled. This curve commences in the year 1896, which is the year in which the Association of Edison Illuminating Companies established its lamp-testing bureau. I will refer to that again because it is brought to my mind by the date at the beginning of the curve. Before that time lamps were sold simply on a guarantee that they would live 600 hours. No representation was made, no guarantee was made of their candle-power during those 600 hours, nor were lamps sold on any specification as to their range in candle-power or efficiency. Beginning in 1896 with the establishment of this lamp-testing bureau, lamps were purchased by the Edison Association subject to specifications, and tests were made to determine whether those specifications were fulfilled. Beginning then, lamps were sold on specification as to range in candle-power and range in efficiency at the voltage marked, and in life, to 80 per cent of their initial candle-power. That marked the beginning of the modern method of selling lamps, and I assure you, speaking from a lamp-maker's point of view, that the introduction of specifications and testing in the sale of lamps has been the greatest incentive that the lamp-makers have ever had to improve lamps, to constantly improve them, so that as time has passed on we have been able to narrow our specifications as to spread of candle-power and efficiency, and to improve materially the life of the lamp during its useful period of burning.

I would like to refer for one moment to page 281 on the subject of inferior lamps. That is a very serious subject to all of us. There is only one way in which good lighting service can be delivered, and that is by a uniform supply of electricity, and a uniform lamp for converting that electricity into light. If you allow lamps to vary, the effect is just the same as allowing your electrical supply to vary. The light will not be of as good quality. Now, who gets these inferior lamps? They are sold and sold in increasing quantities, as the report states; and that is a fact. The report calls them inferior lamps, but it gives you no data as to the amount or character of their inferiority. As a matter of fact, they are inferior both as to rating and as to life, and tests have been made in considerable numbers which show that these lamps, purchased on the market to-day, are only one-third as good as the standard mazda lamp which we all use.

How are you going to protect your customers from these lamps. They are offered for sale. Salesmen canvas your customers and try to sell them, and they will sell them at a reduced price. How are you going to prevent it. The report is very specific in recommending that central station companies see to it that lamps of the highest-grade obtainable be made available to customers at reasonable prices. Gentlemen, there are two ways of doing it. There is a way of handling lamps, selling them at a standard price or selling some of them at a reduced price, but however you supply your customers, they should buy lamps that have been sold on specification and subjected to test. I do not know of any other way of guaranteeing good lamps to your customers. If they are sold and bought on specification and tests, they will know what they are getting. A great many lamps are bought and sold that way to-day. The Edison Lamp Works, which I represent, sell nearly one-half of their total product on specifications. It may seem that I am talking against the interests of the manufacturer when I say that I wish all our lamps were sold that way, but I do wish it. No greater incentive could be given to lamp-makers to have every lamp the best possible, than to know that every lamp is to be sold on specifications and subject to test. I hope you will consider that. All the larger companies, and a great many of the smaller companies, buy their lamps that way now. A great many customers not incorporated as lighting companies buy their lamps subject to test. That method is just as available to the small companies as it is to the larger. The United States Government buys all of its lamps subject to test, and has framed specifications of its own, on which all its lamps are purchased.

MR. JOHN F. GILCHRIST, Chicago: I have not looked into this report carefully, but it is apparently a remarkable report and shows a great deal of work. One thought has come to me as I sit here that I should like to put before you, although the horse may already have been stolen. A great many of us have a tendency fostered I think by the representatives of the manufacturer, although it may be without direct instructions, to give away to the customer all the advantages which come from the use of these new illuminants. I fully believe that customers should be given their share, perhaps, if you will, a little more than their share, but I think it is a very great mistake for us to allow the managers of small properties to go ahead on their own initiative, and without making any proper agreement or without in any way getting due credit, immediately give away all the advantages of higher candle-power. It is a fact, as we have discovered in our companies, that the representatives of the manufacturers are exceedingly active in matters of this sort. The manager should know enough, without question, not to fall in with such suggestions without giving proper consideration to the matter.

Let us assume a case of a town where the central station is having some difficulty with the franchise and is trying to work new town contracts. Some lamp salesman comes into town and prevails upon the manager to let him run about a 1000-watt light and put it out in the street. Once this is done the manager will have great difficulty in getting the city council, or whatever body he has to trade with, to come down to the type of lamp and the quantity of light for which it can afford to pay.

I believe that if all the members of this Association, when questions like this come up, would get in touch with the Lamp

Committee of the Association and find out what is being done in other places, and what it is wise to do, and will only give a little thought and consideration to the matter, it will be very much to the advantage of us all.

MR. S. E. DOANE, Cleveland: It is my desire to discuss this report and not in any sense to criticise it, or to attempt to add to it, because it has come up to the high standard of reports of previous years. I am glad this discussion is before the Commercial Section, because this last year the engineers of the lamp companies have had more commercial or application problems than for a great many years previously. Only a few months ago quite a wave of apprehension swept over the country as to the danger of fire resulting from the use of newer lamps which were hotter than the old ones, the mazda C lamp being hotter than the mazda B lamp. This anxiety originated in a ruling by the City of Chicago, the result of which was the writing of insurance rules and their later modification by our Committee, as indicated in the report.

We took the 300-watt lamp out of the class which used the medium screw base and put it in the class using the mogul base, not because there was any question whether the smaller socket would carry the current but rather because the larger sockets stood the higher temperatures better than the older, smaller sockets on the market. This also gave us an opportunity to establish a new light center for this size of lamp. We made this light center 7 inches, which was the light center length of the 400 and 500-watt lamps, and which was also the light center length of the street series lamps of 250 candle-power and upward. This placed the 300-watt lamp in the same class as the 400 and 500 watt, in the sense that the fixtures in which they are used can be employed by either series or multiple service by installing the mogul socket with or without a film cutout, etc., as the case may require.

Apropos of Mr. Gilchrist's remarks, I think that he should give the lamp manufacturers credit for having protected the interests of the industry to their best ability. In every other civilized country of the globe the billboards in the street, the theater tickets, street car tickets, newspaper advertising and notices and posters of all descriptions, carry everywhere a slogan to this general effect: "Save 70% of your lighting bills." "Reduce your cost of light two-thirds." "Pay one-third for your light by buying the new lamps." We avoided this condition in our country by two means. First we changed the rating of the lamps for multiple lighting service from candle-power to wattage. We can easily imagine what would have happened if the rating of these lamps had been retained on the candle-power basis and the customer had continued to ask, let us say, for a 16-cp lamp. We eliminated the whole difficulty by standardizing the wattage ratings of the carbon lamps rather than their candle-power rating.

In the second place, instead of using the slogan of the same light for less money we advocated in every way that customers should buy the new lamps because they gave three times as much light as could be had heretofore for the same money. I am very much of the opinion that this concerted action on the part of the manufacturers has been of great benefit, and should go far to offset those sporadic and ill-advised efforts of which Mr. Gilchrist complains.

I am glad to have this opportunity to say to central station men that I believe every manufacturer is fully cognizant of the fact that without central station success the industry does not succeed, and hence the business of the manufacturer does not prosper.

Let me repeat in closing, I wish my discussion to be considered a testimonial of my appreciation of the high quality of this report.

MR. LAWRENCE A. COLEMAN, New York City: In connection with this report, I wish to state that it is Mr. Smith's desire that the members of the Association use the Lamp Committee to obtain information on this most important subject of lamps.

I think it may be interesting, in view of what Mr. Howell has said, to give some facts regarding the performance of mazda C lamps on our lines in New York.

On January 1st we had about 1000 of these lamps, divided between 300 and 400 watts. These replaced 450-watt arc lamps. The lamps so far have given complete satisfaction, both to the City authorities and to ourselves, while the change has resulted in a great saving to us in inspection and other expenses met in connection with the maintenance of the arc lamps. The lamps are making good, and the manufacturers are standing behind us, making allowances on the basis of an average life of 1000 hours for each lamp.

The City is now negotiating with us to replace some of the present gas lamps with 200-watt mazda C lamps. This type of lamp will be used largely in the side streets. The introduction of the mazda C lamp in New York for street lighting was largely due to the policy of economy practiced by the present administration. A substantial amount was deducted from the lighting appropriation and it was owing to the necessity for meeting these conditions that the wholesale change of equipment was made. The revenue from the mazda C lamps is less than that we received from the arc lamps, but the reduction will be more than made up when the 200-watt lamps referred to have been installed.

Another matter that I might touch on, and this has been referred to in the report, is the change in the lamp renewal policy in New York City. On May 1st our Company, in connection with the reduction of the maximum price for current from ten to eight cents per kw-hr, discontinued the practice of furnishing free renewals. This service may still be obtained from the Company by the payment of ½ cent per kw-hr additional.

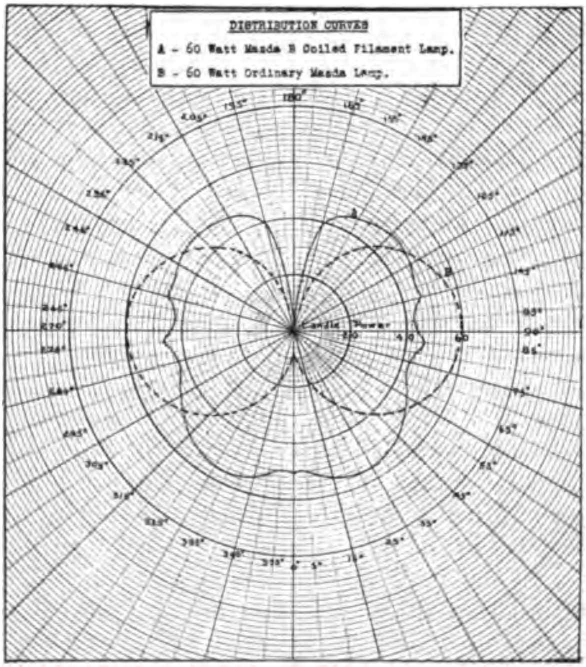
It was the desire of our Company that our customers accept this service, but it may be interesting to know that thus far the response has not been very great. When I left New York, we had signed for this service, 7000 of our 47 000 customers. I presume that most of them are waiting until they need renewals, when they will sign. When we changed over we left the installations intact and made no attempt to remove them.

Mr. W. H. Rolinson, New York City: The discussion relating to mazda C lamps has been of particular interest and I think perhaps the delegates might like to hear something about their life performance, which the report does not cover in any detail.

During the past year the mazda C lamps have been more or less in the developmental stage, but present indications would seem to lead us to believe that they have arrived at a more or less stable condition, particularly so far as their general shape and appearance are concerned.

The candle-power performance curves of the 500-watt 105/125-volt mazda C lamp, which can be considered a typical size, show that the candle-power value of these lamps at the end of their guaranteed life is still 82 per cent of its initial value. The change of wattage throughout life is also of interest and it will be noted that the energy consumption drops off very slowly, so that at the end of a 1000-hour life period the wattage is still 96 per cent of its initial value.

One of the most interesting features concerning mazda C lamps is the candle-power performance of the lamps used for street lighting. The candle-power performance of the 60, 80 and 100-cp lamps, which may be considered typical of all such lamps, shows that within a few hours after being installed the candle-power goes above 100 per cent and remains there at least throughout a period of 1000 hours. The mazda C series lamp, therefore, represents the ideal lamp, in that it retains its initial brilliancy throughout its guaranteed life, and as such it is a most desirable lamp for the character of service in which it is employed.



In the report of the Committee some mention has been made of small 25, 40 and 60-watt, coil-filament lamps, and it would seem of interest to indicate the difference between the light distribution characteristics of these two lamps.

Beyond the fact that the mazda B, coil-filament lamp has its distribution charactertistics so that the maximum light is given in a downward direction, and shows perhaps some little difference in color of light, it has no inherent advantages over the regular style of lamp. I wish therefore to emphasize the statement of your Committee, that the candle-power and efficiency values of the mazda B, coil lamp are not greater than those of the corresponding vacuum lamp and its life characteristics are shorter; in fact, its life may be stated to be approximately two-thirds that of the more ordinary style of lamps.

Mr. P. S. Millar, New York City: To the statements made by previous speakers concerning the improved performance of mazda C lamps, I can add a little information. In the early days of this lamp, a great deal of trouble was experienced, especially with the larger multiple lamps. A recently conducted survey of performance in service in various cities in the East, as well as our own tests at the Electrical Testing Laboratories, now indicate that no considerable difficulty need be apprehended with the lamps now being put out. Reasonably good performance is being obtained generally.

The report of the Lamp Committee emphasizes the importance of burning mazda C lamps tip downward. This seems to me a regrettable limitation. It detracts somewhat from that simplicity which has been such a large factor in the success of the incandescent lamp. It is much to be hoped that the manufacturers may find it possible to adopt a form of construction which will make this lamp, like other incandescent lamps, available for use in any position.

The newly announced blue-bulb mazda C lamps are described in the report. These I understand cost about twice as much as the clear glass lamps. Their life is probably shorter, though I think reliable data are not available upon this point. The suggestion which has been thrown out appeals to me very strongly; namely, that anything which can be done with the blue-bulb mazda C lamp can be done equally well with a color filter. The latter scheme appears to me better because it possesses the advantage of economy and simplicity. It is not necessary to purchase a new color filter every time a lamp fails. Also, color filters may be changed readily to obtain different tints of light with the same lamp. The blue-bulb lamp appears to me to have value chiefly as a novelty.

Elsewhere the report comments on the new concentrated filament vacuum lamps. These lamps are more costly and have a shorter life than corresponding sizes of mazda lamps of the usual type. The filament brightness is very high, and as the lamps are available in small sizes, they are peculiarly liable to misuse in practice. Low-price stores find them attractive because they are a novelty. It seems to me that this type of lamp has very little excuse for existence. If I understand correctly, lamps of this type were imported and the American manufacturers placed the type on the market largely as a defensive measure. I doubt very much if the American manufacturers feel much conviction that this type of lamp has real merit. The purposes of good illumination would be served if it could be suppressed.

The discussion in the report of inferior lamps is to my mind one of the most important matters which the Committee has considered. There are three kinds of tungsten lamps on the market, respectively the mazda lamp, American tungsten-filament lamps which are not mazda lamps, and imported tungsten-filament lamps which are not mazda lamps. Some of the lamps which are being sold at the present time are greatly inferior to the mazda lamps. Not only are they inherently deficient in efficiency and life, but they are also put out without regard to the service in which they are to be employed. They are not a regulated product. Their use is increasing. They constitute a real menace to good lighting conditions. They can be kept off the circuits only if the central station controls the lamp supply to its customers. So far as I can see there is no other organization which can and will exercise this control except the central station.

The Committee comments upon arc lamp developments. In this connection I would say that a very complete statement of illuminating efficiencies of arc and mazda C lamps is embodied in the street lighting report to be presented at this convention.

In conclusion I should like to add my word of commendation on the work of the Committee and upon its very excellent report. This bears on its face the evidence that throughout the year the Committee has been on the job.

MR. T. I. JONES, Brooklyn: We have made a careful study of type C lamps in Brooklyn for the past year. A year ago the 1000-watt, type C lamp was brought out; and notwithstanding the protest of Engineer Howell that it was not then commercial, the selling side of the lamp industry stated that the lamp could be placed upon circuits and burn 1000 hours. In Brooklyn we devised a unit to contain the 1000-watt lamp, and we made a special campaign among our commercial customers, stating that we would supply anybody with a unit containing the 1000-watt lamp, and would renew such units as we had been renewing the 60-watt lower type of lamp. What was the result? For the first four months of the free renewal period our principal job was replacing the 1000-watt, type C lamps which would burn 300 hours and less. To make a long story short, let me say that we tried everything we could think of, and every measure suggested, and we have not yet received a supply of 1000-watt, type C lamps that have averaged 1000 hours.

That is the bad side of the story. I think it is always well to state the weak side first. Later on came the development of the 300-watt gas-filled lamp. Mr. Coleman was kind enough to say that we met the city half way, and suggested the 300-watt gas-filled lamp. The only connection that I can think of between meeting the city half way and the company is the fact that there were 4000 arc lamps in Brooklyn, which the city cut to two thousand with the 300-watt lamp, and that amount was half the number of arc lamps. (Laughter) The 300-watt lamp is a real lamp so far as our experience goes in Brooklyn. The street lighting of the city is becoming electrified to the extent that 300-watt lamps are being placed where many gas lamps were before.

As to the customer's use of these lamps, it has been said that they ought to burn pendant. Our principal trouble has been the heat rising up to the base of the lamp; and it seems to me that if the lamps could be entirely reversed there would be more hot air at the bulb of the lamp and the failures would not be so noticeable. That has been our trouble—heat at the neck of the lamp.

As to supplying lamps in units to customers, we are doing that regularly on a free renewal policy, and it is panning out with much success outside of the 1000-watt unit.

One of the speakers has alluded to the fact that the New York Edison Company in exchanging rates, supplied a rate for lamp renewals, and permitted the customer if he did desire lamps to get them for half a cent per kw-hr extra. We haven't followed that example in Brooklyn, first because we haven't reduced our rates, and secondly, because we want to see the result of such a policy on our friends across the river.

The question of the free renewal of lamps is a serious one. To be sure, every lighting company which has a certain kilowatt-hour rate has its attention called to the maximum part of that rate as its current cost. The company is not given any credit if it supplies lamps with that rate; and the lighting company should not give anything that it does not get credit for. But on the other hand, if it does not supply lamps on a free renewal basis, is there not danger that the result will be a poor condition of illumination? Shall we not in the end find hundreds of places where people will not buy a lamp and put it in the socket, where they do put it in the socket now because the lamps are given free? I think the lamp question is one of the most important that the central station has to deal with, and this report should be analyzed carefully, the kind of lamp applicable to the company's service studied, and the connection between free renewal or non-renewal of lamps and the company's rates carefully considered, before definite action is taken.

CHAIRMAN BURNETT: I should like to add a few words of discussion on a matter which has claimed some of my attention, the general subject of better service to customers as affected by various methods of labeling lamps.

The remarks of the several speakers have indicated clearly that there is considerable uncertainty as to the voltage of lamps which customers may secure when buying lamps in the open market. It is a matter of more or less common knowledge that customers who get their supplies of lamps from the dealers are likely to get lamps which have not been carefully selected with local voltage conditions in view. A representative of one of our largest lamp manufacturing companies told me that there was delivered to him from his own stock, for use in his own home in that neighborhood, a 108-volt lamp when he should have been supplied with a 115-volt lamp. That is merely typical of conditions which exist more or less in all of our large centers of population, and in fact the world over.

Lamps are marked for one specific voltage, 40 watts, 120 volts, for instance. Now in any one community, a large proportion of customers' lamps will operate more than one volt away from the labelled voltage condition, and for a large part of the time. There are many companies in the country, each of which has various standards of voltage supply, because of having a distribution system covering a large territory, especially in suburban and rural districts. At points near the station the voltage is high, and at points remote, it is low, the result being that the company will either assign a certain voltage for each individual customer, that voltage being dependent upon tests of the voltage actually obtained—or will adopt a zone system, and parcel out certain parts of the territory, say points near the station, to be supplied with 115 volt lamps, points further out with 113 volt lamps, and points at the remote parts with lamps of a still lower voltage.

There are, of course, variations in voltage during any one day on account of variations in load and no one company can undertake to keep a certain definite voltage at any one lamp. It would be physically impossible to keep the voltage of any one lamp at the voltage marked on the label of the lamp furnished to the customer, no matter how conscientious the central station man, or lamp dealer might be in picking out the voltage of the lamp, to be furnished to the customer.

We all know that for a number of years past we have had available voltages from 100 to 130; latterly, lamps have been available from stock in voltages of 105 to 125 volts, and in looking over the curve of output of lamps of different voltages during the past year, we find an exceedingly irregular curve, with peaks at 110, 112, 114 and 120 volts, successively decreasing in amount. The exact shape of that curve, I fancy, varies more or less from year to year but whether it shows a general tendency to remain the same or to change in any definite way, I do not know.

From the standpoint of self-protection to the manufacturer the present method of single voltage labelling is apparently ideal. Suppose, for instance, that the Bureau of Standards makes an inquiry; as the matter stands today the lamp manufacturer can be absolutely certain that the lamps he is putting out are in accordance with the standards, because lamps are labelled for certain, single definite voltages. But it seems to me that there is grave danger to the lighting companies in continuing to label lamps for a single voltage standard only, in that the authorities may be over rigid in demanding excessively close adherence to a single voltage, seeing that the central stations have sanctioned the single voltage label, without providing thereon for variations in the supply voltage.

In order to improve conditions I proposed to the Lamp Committee that it might be advisable instead of labelling the lamps for individual voltages to label for say only three standard type voltages. Let one be 110, another 115, another 120. Mark the first set of lamps with a red label, the second set with a white and the third set with a green. Let it be fully understood among manufacturers and the central stations and let the information be published that red always means the 110-type voltage, white, the 115, and so forth, and that the lamp is suited to operation two volts either way. If instead of having the entire range, 105 to 125 volts, for jobber, customer and the lighting company to select from, we had but three, we could then very easily train our customers, employees and the dealers in any one locality to use lamps with the proper label. A central station man may be able to train his customers and the lamp dealers to use the red labelled lamps, for instance, though he finds it impossible to make them order according to voltage, because people will not bother with the figure. It seems to me that while this method would not perhaps be scientifically correct, while it would not perhaps meet the approval of the members of our Lamp Committee who have given this matter much more attention than I have, yet in many ways it would improve the service conditions, in that it has many practical advantages.

There is one aspect of this proposition that would be of special interest to the central station companies; that is, it would tend to push us forward more rapidly toward the standardization of distribution voltages. Standardization for standardization's sake is an economic waste, but for good economic reasons is a necessity. The interest of manufacturers in the standardization of voltages would be that in building apparatus they would have much less variation to provide for in the factory, and could manufacture generators, transformers, and other apparatus and equipment under better conditions, and consequently, at less cost. The interest of the central station in this phase of the matter is that the stock of lamps to be kept on hand would be much less in amount. In companies operating under several voltages the saving in the number of lamps on hand would amount, in certain cases, to thousands of dollars, besides which all companies could at once cut down on the clerical labor of handling the lamps.

I do not think that this plan needs much consideration on the floor of this Convention, but I do think that the principles of better service to lighting customers, by and large, which are involved in this proposition are deserving of closer study; and I would like you to note in this connection that our Lamp Committee itself has suggested in the report that it might be well to discuss this matter further.

Summarising, I propose that we settle on three standard type voltages for use in labelling lamps, for the following reasons:

(a) Customers will get lamps better suited to existing voltage supply

(b) The tendency will be toward more comprehensive standardization of supply voltages on any one distribution system, and consequent better service to customers

(c) Lamps now labelled a single definite voltage are subjected to variations in voltage as a result of variations in load, etc.

(d) The curve of lamp output shows peaks at 110, 112, 115 and 120 volts, though a demand for all other available voltages

(e) There is danger of demands for excessively close adherence to a single voltage for any one distribution system, consequent upon the continuance of the single voltage labelling

(f) With better standardization of operating voltage, the cost of manufacturing apparatus may be decreased

(g) Lamp stocks of lamps will be decreased, reducing the amount of unproductive capital therein

(h) This plan can be adopted on the initiative of the lamp manufacturers or of our central station lamp committees, without waiting for standard practice to become settled as to operating voltages, and without embarrassment to central stations.

CHAIRMAN BURNETT: We have still another very important paper for the afternoon, and I will ask Mr. Freeman to close the discussion.

MR. FREEMAN: I do not think I have anything to add for the Committee. Mr. Smith desired very free discussion on the matters referred to in the report. I am sure he has had his wish in that respect, and will read the discussion very carefully, and act for the Committee as he sees best.

CHAIRMAN BURNETT: The Chair will entertain a motion to accept and print this report.

(Motion seconded and carried)

I will call upon Mr. T. I. Jones to present the report of the Committee on Wiring of Existing Buildings, in the absence of the Chairman, Mr. R. S. Hale of Boston.

REPORT OF COMMITTEE ON WIRING OF EXISTING BUILDINGS

We were asked to have our report ready for the printer by March 15th, which means that this report was made up at the meeting of the Committee on March 5th, in Boston.

Any subsequent work, particularly in regard to the action of the manufacturers on standardizing plugs and receptacles, and of the Underwriters on bare concentric wire and changes in the Code, will be made the subject of supplementary reports which will be placed before the membership in the BULLETIN or technical press if practicable, but if too late even for this, will be reported on at the Convention.

It may be noted here that a similar committee of the National Electric Contractors Association and also representatives of the Washington Bureau of Standards were invited to all our meetings and were a great help in our deliberations.

PART I

PLUGS AND RECEPTACLES

Our progress toward standardizing plugs and receptacles has been slow, but we believe we have accomplished some definite results, with more to follow.

The first step was to obtain recognition of a distinct class of these articles that would be regarded as suitable for use on lighting circuits instead of involving the use of a separate circuit switch and pilot light. This was brought out in our previous reports, and although the Underwriters did not wish to take any action at that time, we finally obtained an agreement among the manufacturers whereby we could publish the preliminary report that appeared in the BULLETIN last winter, with a list of plugs and receptacles none of which were to be rated at capacities any higher than those allowed on lighting circuits.

We have hopes that the Underwriters will recognize this classification at the March 1915 meeting, but even if they do not, the mere existence of the list will, we think, work toward the result that inspectors will not discourage the use of receptacles by requiring that a separate circuit switch and pilot light be installed merely because a receptacle is used instead of a lamp socket.

The list given in the preliminary report was, of course, only a first step and included entirely too many types. We therefore arranged for a meeting of the manufacturers on February 15th, at which meeting a cordial desire to reciprocate was shown, and the meeting adjourned to March 4th for further action, and on March 4th again adjourned to March 23d.

The patent and commercial difficulties are great, and there is also an engineering difficulty in that there is as yet no decision whether the type of plug that will pull out at any angle but of which the contacts in the base part must be more or less exposed, is or is not preferable to the type which will pull out only by a straight pull but of which the contacts in the base or receptacle can be much better concealed. At the time this goes to the printer the subject is very active, and we hope that by June we may be able to report an agreement on not more than two types, besides of course the screw type that will take an Edison base lamp.

The standardization of the larger types that have capacity for devices too large to be allowed on lighting circuits is not so important except in respect to plugs for charging batteries, since most devices other than batteries that are too large for lighting circuits are seldom moved from place to place, and this question will be taken up with much greater advantage after the standardization of the small sizes is accomplished.

In case there should for any reason not be a supplementary report on this subject, we may say that the question of polarity plugs has been brought to the attention of manufacturers and is being considered along with the other problems.

PART II

COST OF WIRING

In previous years we have recommended a system of unit prices for wiring whereby the central station salesman could close a contract and then turn it over to the wiring contractor to do the work. Such a system is, we believe, the best means for getting business without the central station itself going into the wiring business, as it permits the salesman to do the selling, for which he is best fitted, and the wiring contractor to do the actual wiring work.

The unit prices to be adopted in different localities vary with conditions. In a supplementary report prepared by Mr. H. E. Eisenmenger we show the actual prices that are being used in many cities. The variations are great, but in our opinion are due chiefly to differences in kind and quality of work rather than to different rates of profit. Open wiring costs less than concealed armored cable, attic entrances are cheaper than basement entrances, the omission of a ground wire saves money although it may add to the danger, and so on.

We believe that it will be of greater interest to present actual prices as taken from numerous printed circulars than to analyze too closely the published prices, since more exact analysis would involve so much detail as to obscure the problem rather than make it clearer.

We recommend that cities where the prices are not getting all the business desired, should compare notes with other cities whose conditions are apparently similar. High prices may be due to frills that could be omitted, at least for some kinds of houses, and low prices may be due to the omission of things that would be well worth the money.

In the present state of the industry we believe that general publicity will accomplish more and give better results than if we should try to establish standards for different localities and conditions.

PART III

HANDBOOK

In order to promote interest in and stimulate the wiring of both old and new buildings, we have felt that some sort of handbook corresponding to the Salesman's Handbook, the Meterman's Handbook, etc., would be of use, and in co-operation with the Society for Electrical Development we started on such a book, but our Publications Committee suggested that an arrangement could be made with the editor of Cushing's *Standard Wiring* so that that book would cover the field.

We therefore entered into negotiations with Mr. Cushing, which resulted in our turning over to him the material we had prepared, and he has incorporated this in his book with the revision necessary to make it fit in with the rest of his matter. Mr. Cushing assumes all responsibility, the title pages and introduction merely stating that the book is published with the co-operation of our Committee and of the Society for Electrical Development, and the understanding is that we will do our part in the annual revision, but that if at any time the arrangement should become unsatisfactory we shall be entirely free to cut loose and get out our own book. In the meantime we obtain copies at a wholesale price for re-sale to our members at a profit, and the arrangement both technical and financial is extremely satisfactory.

PART IV

STANDARDIZATION OF SCREW THREADS FOR LAMP BASES

This subject has been under consideration by a Committee of the American Society of Mechanical Engineers, which has adopted with some minor changes the standards already in use by our Class D members.

The result of the work of this Committee was submitted to the National Electric Light Association and to our Committee. The standards suggested appear to be satisfactory to the manufacturers, and although we have not gone into the details we believe our Association may properly accept the results.

PART V

NATIONAL ELECTRICAL CODE

At the Philadelphia meeting the chairman and vice-chairman of our Committee were charged with the duty of appearing before the Underwriters to oppose any changes that would increase the cost or decrease the safety of wiring, and to favor changes in the opposite direction.

As a result we considered numerous matters, and without reporting on those on which we did not take any stand, we felt that the following points did need attention.

We were in favor of changes that would allow or even require a solid connection for grounded wires, whether neutrals of 3-wire systems or the grounded sides of 2-wire systems, so as to avoid the expense of fuses and fuse holders and of switches on such wires (with the possible exception of the service switch); so as to avoid also the danger to both life and property that is incurred whenever a fuse blows or a switch opens on such a wire without the other wire being disconnected at the same time.

We expressed ourselves as opposed to any rule which would require that all sockets be designed for 660 watts.

We also felt that there should be a stronger movement toward a proper balance in the rules, and that changes in ruling that increased the expense should not be approved unless it was clear that the change would lead to a way of spending the money more efficient than applying it in some other direction.

Changes in the rules along these lines were submitted to the Underwriters through your insurance expert, Mr. Blood, but have not been acted on at this writing.

PART VI

BARE CONCENTRIC WIRE

One of the most important things accomplished by the Committee came as a result of the investigations made in Europe by Mr. Doane and Mr. Einsenmenger, and reported upon at the June 1914 Convention. As you will remember, these showed that several wiring systems had been developed so safe that insurance companies were using them for wiring up their own offices, ornamental enough to be used for the finest kind of houses, and cheaper also than other systems for wiring up the old houses in which this Committee is interested.

We found that in America there are a tremendous number of old houses yet unwired; that in New York City, for instance, less than 10 per cent of the existing houses and apartments (excluding the expensive elevator apartments most of which were wired when built) are supplied with electric service, while other eastern cities show a correspondingly low development, and though our western cities make a better showing this is largely because the houses are newer and were wired when built.

On the other hand, we find that in such cities as Strassburg and Milan the fact that electricity is dearer and gas cheaper than here, has not prevented the wiring up of a very high proportion of these old brick or stone houses, so that the men who are earning $10 and $5 a week are, nevertheless, using electricity in their homes. Both companies are on a very satisfactory financial basis.

While there were other reasons for the development, particularly in Milan where a system of flat rates controlled by a limiter is in vogue, yet it appeared to us that the chief reason was the wiring, since in Strassburg this flat rate system is not in use at all. We therefore inquired why these wiring systems are not in use here and found that numerous sections in the Code prevented. The reason for this is interesting, and may be described here.

The Code originally called for completely insulated circuits, even the underground neutral of direct-current 3-wire systems having to be grounded to comply with Code requirements. Later on it was found that this resulted in danger rather than safety, and the grounding of the neutral of 3-wire or of one side of 2-wire distributing systems was first made optional and later, obligatory.

We will not take up time with the history of this change, except to remind you that while to-day the neutral must be grounded solidly to a waterpipe or its equivalent, so that it is of the same potential, yet when we get even six inches away from that solid ground we must insulate the wire from the water pipe as though there were 600 volts difference in potential. We leave it to you to decide whether it is better engineering to require all this insulation between parts of the same potential than to put better insulation between parts having different potentials. However there are numerous places in the rules that require this, and hence interfere with using these foreign systems which devote themselves to protecting the wires that carry potential rather than the grounded wire.

There are so many of these rules in the Code, and so many of the foreign systems differing somewhat in details, that instead of first getting or rather asking to have all the rules changed, we requested the General Electric Company, which had already investigated some of the systems, to present one of them to the Underwriters and ask for its approval.

We also conferred with at least one other manufacturer, but did not feel it necessary to make any general move for two reasons, one of which was that these foreign systems are in such general use abroad that any manufacturer who is at all familiar with foreign practise must know of them, and because we are reliably assured that there are no patents (except possibly on a few unessential details of some of the fittings) that would prevent any manufacturer from taking up the work at any time.

The General Electric Company presented a system called "bare concentric wiring" (resembling the foreign Stannos system more than any other) to your insurance expert, who in turn presented it to the Chairman of the Electrical Committee of the Code, Mr. Cabot. He in turn appointed a sub-committee to consider it.

All of these approved the introduction of the new system, but in view of the numerous changes that would be necessary in the Code, it was finally decided not to alter the Code, but merely to continue the Committee for further investigation. This would seem to mean investigation and the obtaining of field experience not only of bare concentric wire but of other similar systems.

This is the condition of affairs at the time we go to press, and further progress will depend on the manufacturers who must put wire and fittings on the market so that some installations can be made, on contractors and central stations who must be willing to make these installations, and on Underwriters and city inspectors who should permit them, of course under proper supervision and inspection.

We believe that all this will be done, and that by the time of the June Convention a number of installations will actually be made, but we must all keep our shoulders to the wheel, because, unlike patentable improvements, there is in this no direct incentive to any particular individual, firm or company, and only by continued effort and co-operation can we get these improvements into the Code.

This whole question of how we shall get the practical experience necessary before changes in the Code are made is a very difficult one; we believe that such experience should be obtained for field conditions under supervision of and in co-operation with the Underwriters.

Bare concentric wire is only one of the many items, and we believe that the National Electric Light Association, while always in co-operation with the Code Committee, should take a strong practical and effective interest in all improvements; in those improvements that avoid unnecessary expense as well as in those that add to the wiring expense.

Respectfully submitted,

R S Hale, *Chairman*
S E Doane, *Vice-Chairman*
F D Beardslee
W A Donkin
G B Griffin
F H Hill
R W Hoy
J E Latta
W P Lyon
C E Robertson
H R Sargent
M E Turner
George Weiderman

FLAT WIRING RATES

A large number of central stations in the United States have prepared Wiring Price Schedules to reduce the overhead charges of wiring by cutting down the cost of estimating.

Flat wiring rates have been established in such a way that for a certain given number or combination of outlets or lights the prices can be read from the schedules by the contractor, the solicitor and the prospective customer, regardless of the material and time actually necessary in the individual case.

In the accompanying tables and curves the flat wiring rates of different cities of the United States have been compiled. The compilation covers the places from which replies to the questions sent out by the Committee have been received, and information from other sources that wiring campaigns with flat wiring price schedules were being or had been made and the schedule prices were obtainable. In a few cases, where the *average* (not flat rate) prices paid per outlet could be obtained from reliable sources these averages prices also are quoted although no flat rate wiring prices prevailed in the particular localities. The compilation does not claim to be complete in any way.

Care has been taken to make the tables and curves represent, as correctly and accurately as possible, the conditions which are prevailing or have prevailed within the last year in the different cities. It must be understood, however, that they are not official statements from the companies, nor should they be regarded as expressing any views of the Committee.

The widely varying conditions prevailing all over the country make it desirable to group the material collected by geographical districts. Houses in the South vary somewhat in type from houses in New England, and conditions different from both are prevailing on the Pacific Coast. The Division into geographical districts has been made according to the official classification of the Bureau of Census at Washington. The whole country is subdivided into nine large districts (see accompanying sketch Fig 1).

1—New England
2—Middle Atlantic
3—South Atlantic
4—East North Central
5—West North Central
6—East South Central
7—West South Central
8—Mountain
9—Pacific

Region	al	Mountain		Pacific	
		Mont N Mex Ariz Wyo Idaho Colo Utah		Wash Ore Cal	
UNIT WIRING PRICES (Average Wiring Prices in Brackets)	rk La kla	Colorado Springs Salida	Colo	Portland	Ore
Special Combinatio				San Francisco Cal (Pac Gas & El Co)	
No Unit P but Instalm Payments		Helena Mont Denver Colo Albuquerque N M			

prices. For further comparison with the other type of wiring schedules prices have been added which would have to be paid

3—South Atlantic
4—East North Central
5—West North Central
8—Mountain
9—Pacific

The States which are comprised under each of these sections are shown on the map (Fig 1) and on Table No. I, which also gives a synopsis of the cities comprised in the tabulation (49 in number).

The larger part of the replies (upper part of Table I) show that a certain definite unit price was charged for every definite number of outlets (usually beginning with a certain minimum number of outlets) either excluding fixtures or including certain uniform types of simple fixture (drop cords) throughout, or both. In a few cases, however, the central stations have another house wiring plan, quoting fixed prices for certain combinations of fixtures, outlets and rooms, etc. The Boston house-wiring plan may be considered typical for this "special combination" plan.

Sixteen different installations of from one to five outlets are quoted in Boston, which consist of combinations of the following five fundamental installations:

No. 1	is a flush receptacle outlet	$14.35
No. 2	" No. 1 and cellar outlet	19.00
No. 3	" No. 1 and piazza outlet with switch and fixture	22.00
No. 4	" No. 1 and hall outlet with switch and fixture	23.00
No. 5	" No. 1 and parlor outlet with switch and fixture	25.50

Besides these there are 11 additions quoted; for instance, dining room outlet with switch and fixture, or china closet outlet with switch and fixture, etc. The fixtures, where quoted as being included, are of a certain definite specified type. Everyone of these items has a certain fixed price and the customer can follow up the plan for his installation by adding such of these items as he may select.

Cities where price schedules of the Boston type prevail are given in the lower part of Table I.

It is not easily possible to exactly compare these "special combinations" price schedules of the Boston type with one another or with the first named type of schedule which gives a price of so much per outlet. Table No. II has been arranged, however, to at least roughly compare such "Boston Type" installations with one another in the following manner:

Installations have been chosen and specifications assumed as indicated at the head of Table No. II. Under these assumptions the table will permit of a rough comparison of relative prices. For further comparison with the other type of wiring schedules prices have been added which would have to be paid for the same installations in a few other cities in the neighborhood, where unit prices per outlet prevail (viz. in Haverhill and Worcester).

Programs of other types of wiring where a definite price is charged for a definite number of outlets, regardless of the purpose for which the room is used, can be more readily compared. This comparison can be made both tabular (Table III) and graphical (Figs 2—10). These price schedules are of course not all based on the same conditions and certain allowances must be made for that reason. One central station may, for instance, include the incandescent lamps in the installation, another may not. Different classes of wiring are used in different cities under their respective flat rate wiring schedules. One schedule applies to existing houses, another to houses under construction.

A serious effort has been made to make these differences apparent in both tabular and graphical comparisons. Efforts have been made to bring all assumptions down to the same basis where possible. For instance, where either installment payments or cash payments are allowed (the latter with a corresponding discount), the assumption of installment payments has always been made for comparing the prices. As it has not been possible to get all wiring prices either excluding fixtures or including a certain type of fixture (for instance, drop cords), two main columns have been made in Table III, one giving the price excluding fixtures and the other including simple drop cords. The same distinction is made in the curves where necessary. The curves show distinctly, however, that the difference between the prices prevailing in different cities is so great that such subtleties as whether drop cords are included or excluded can be overlooked.

In most cases the wiring is done by contractors and not by the central stations themselves. The central station solicits the work and then turns it over to the contractor. In most cases also the central station will finance the work in such a way that it pays the contractor net cash and undertakes the collection of the installment payments from the customer. In a few cases the central station enhances the price paid to the contractor by a small percentage in order to arrive at the price charged to the customer, as compensation for the cost for collecting and to cover bad debts. In these cases the price paid by the customer and not

the price paid to the contractor has been made the basis of the accompanying comparison.

The text in the tables is necessarily as short and concise as possible, and in order to avoid misapprehension it should be understood that in Table III a phrase which occurs frequently, "$2.50 plus $1.50 per outlet," means that a basic charge of $2.50 is made and on top of that, every outlet (in this example) would be charged at $1.50 apiece.

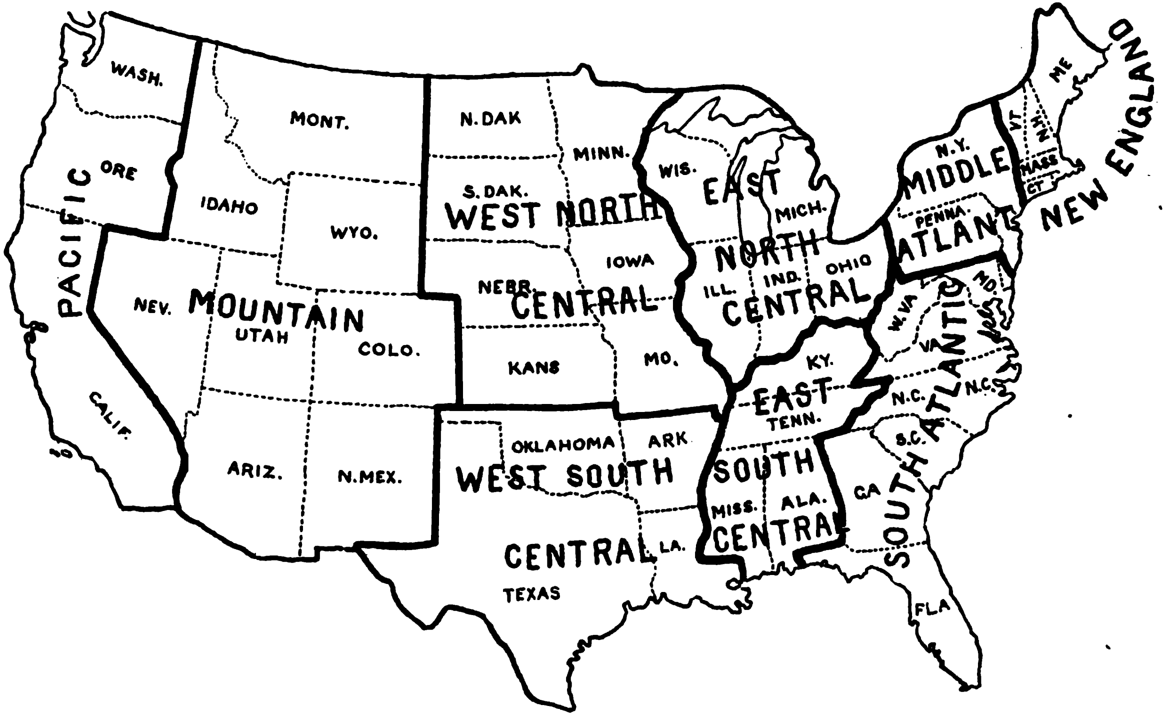
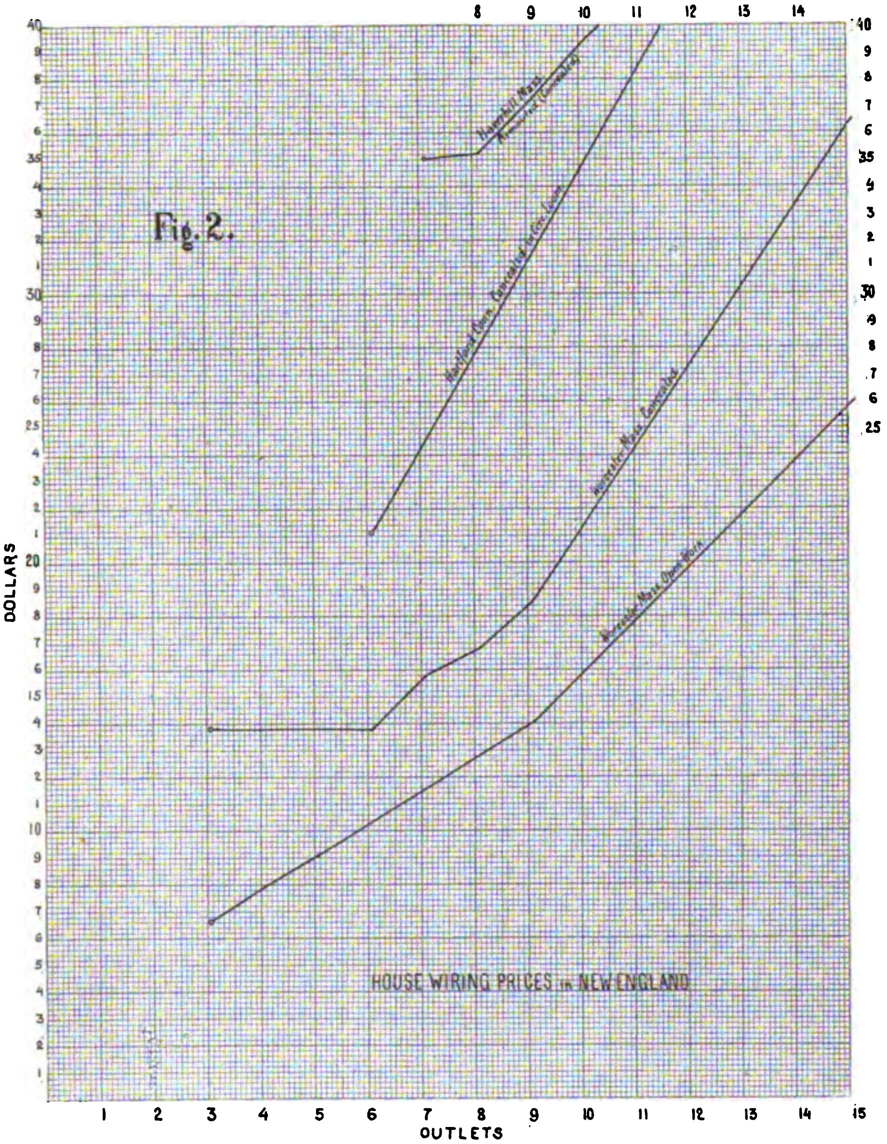

PACIFIC
WASH.
ORE
CALIF.
MOUNTAIN
MONT.
IDAHO
WYO.
NEV.
UTAH
COLO.
ARIZ.
N.MEX.
WEST NORTH CENTRAL
N.DAK
MINN.
S.DAK.
IOWA
NEBR.
KANS
MO.
WEST SOUTH CENTRAL
OKLAHOMA
ARK
LA.
TEXAS
EAST NORTH CENTRAL
WIS.
MICH.
ILL.
IND.
OHIO
EAST SOUTH CENTRAL
KY.
TENN.
MISS.
ALA.
SOUTH ATLANTIC
W.VA
VA
MD.
N.C.
S.C.
GA
FLA
MIDDLE ATLANTIC
N.Y.
PENNA.
NEW ENGLAND
ME
VT
N.H.
MASS
CT

FIG. I

Fig. 2.



HOUSE WIRING PRICES in NEW ENGLAND

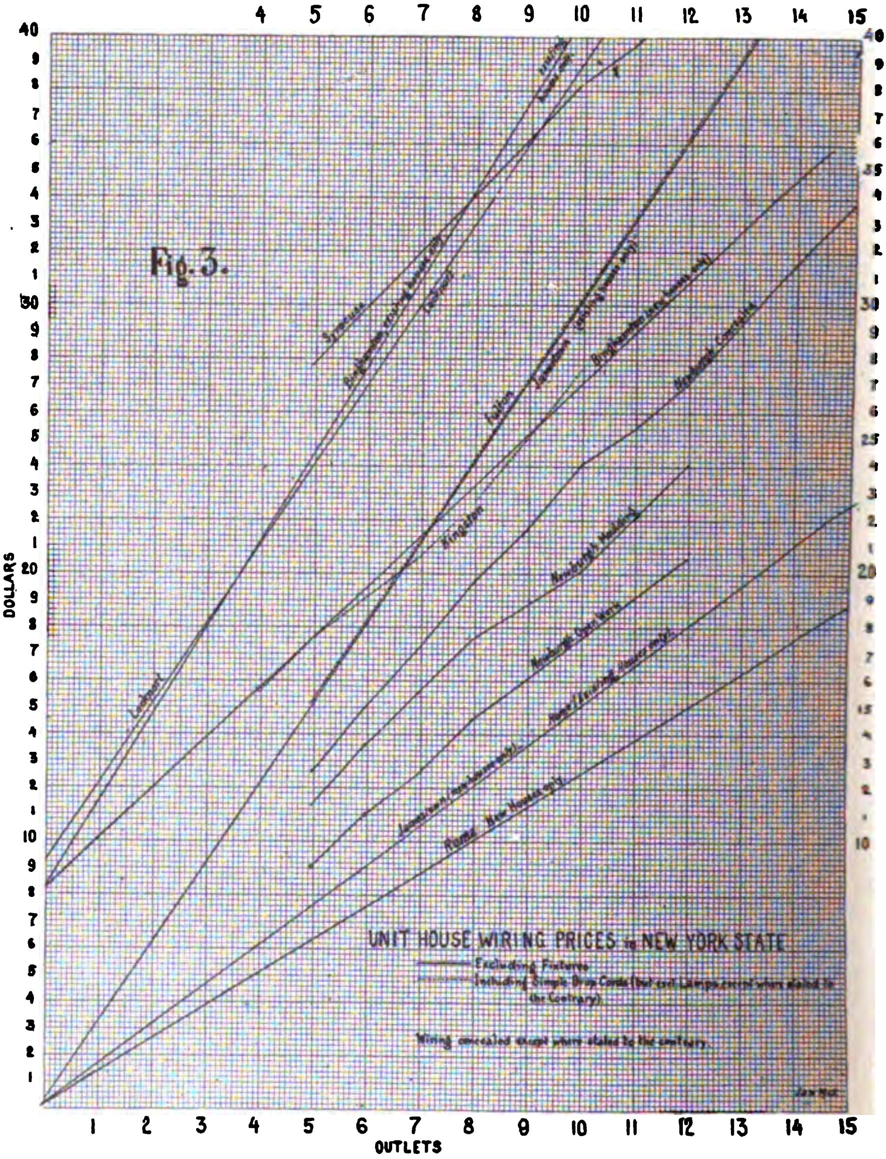


Fig. 3.

UNIT HOUSE WIRING PRICES in NEW YORK STATE
Excluding Fixtures
Including Simple Drop Cords (but not Lamps, except where stated to the Contrary).
Wiring concealed except where stated to the contrary.
Syracuse
Binghamton (existing houses only)
Fulton
Jamestown (existing houses only)
Binghamton (new houses only)
Kingston
Rome New Houses only
DOLLARS
OUTLETS
10
20
30
40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

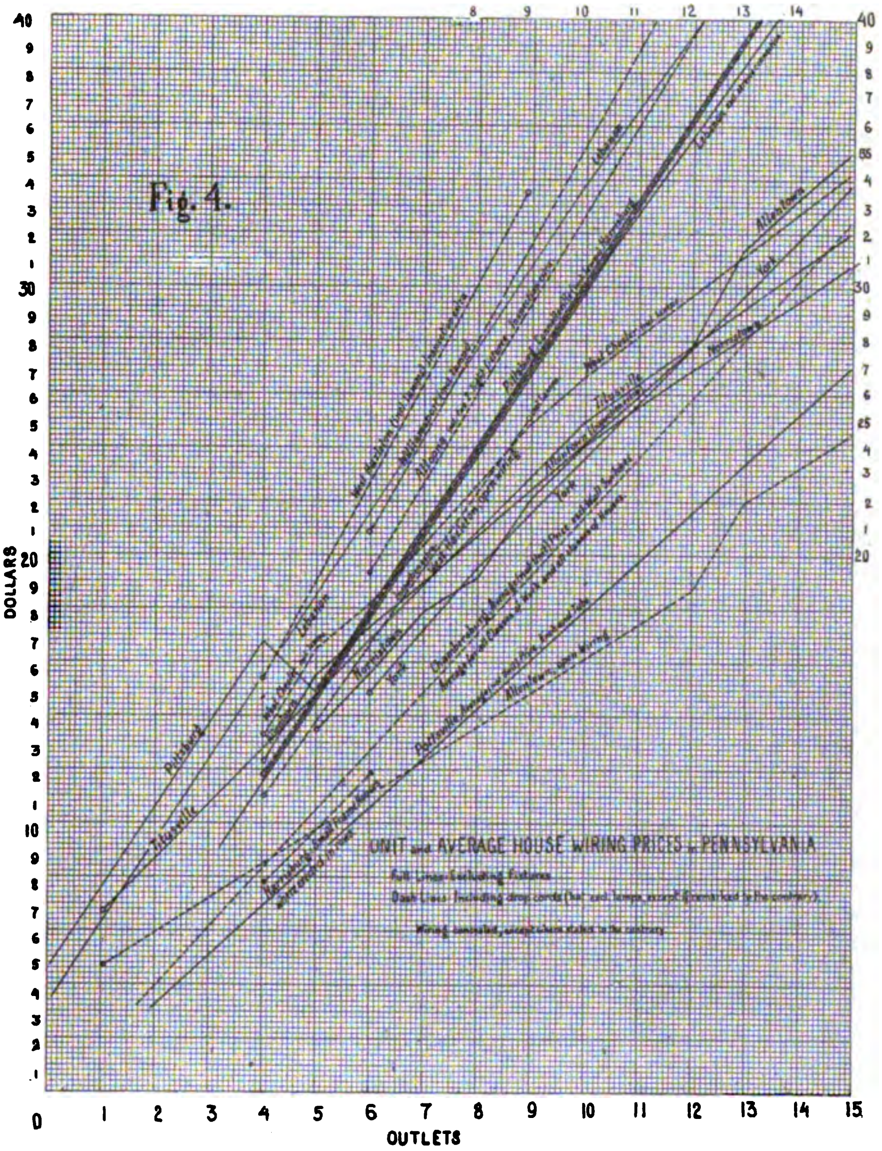


Fig. 4.

The lowest curve (Allentown, open wiring) is too low and should be corrected according to Table III.

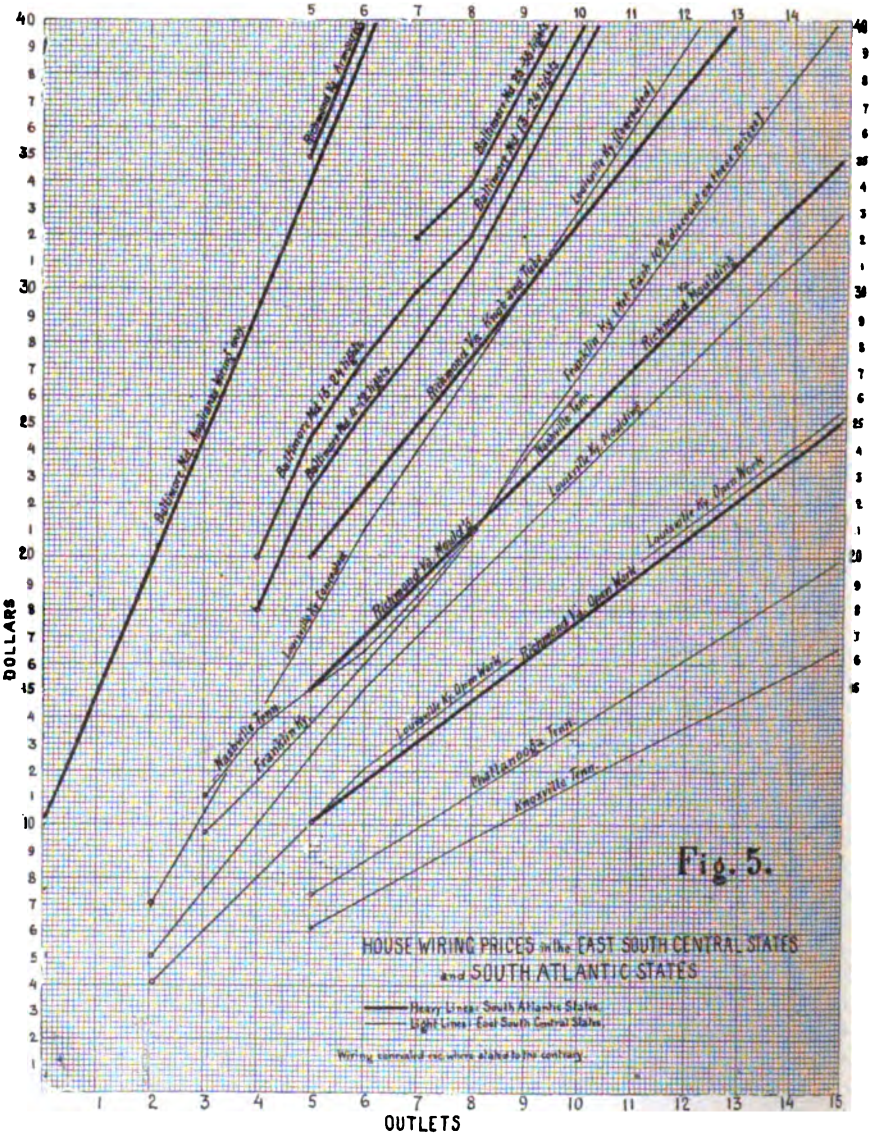
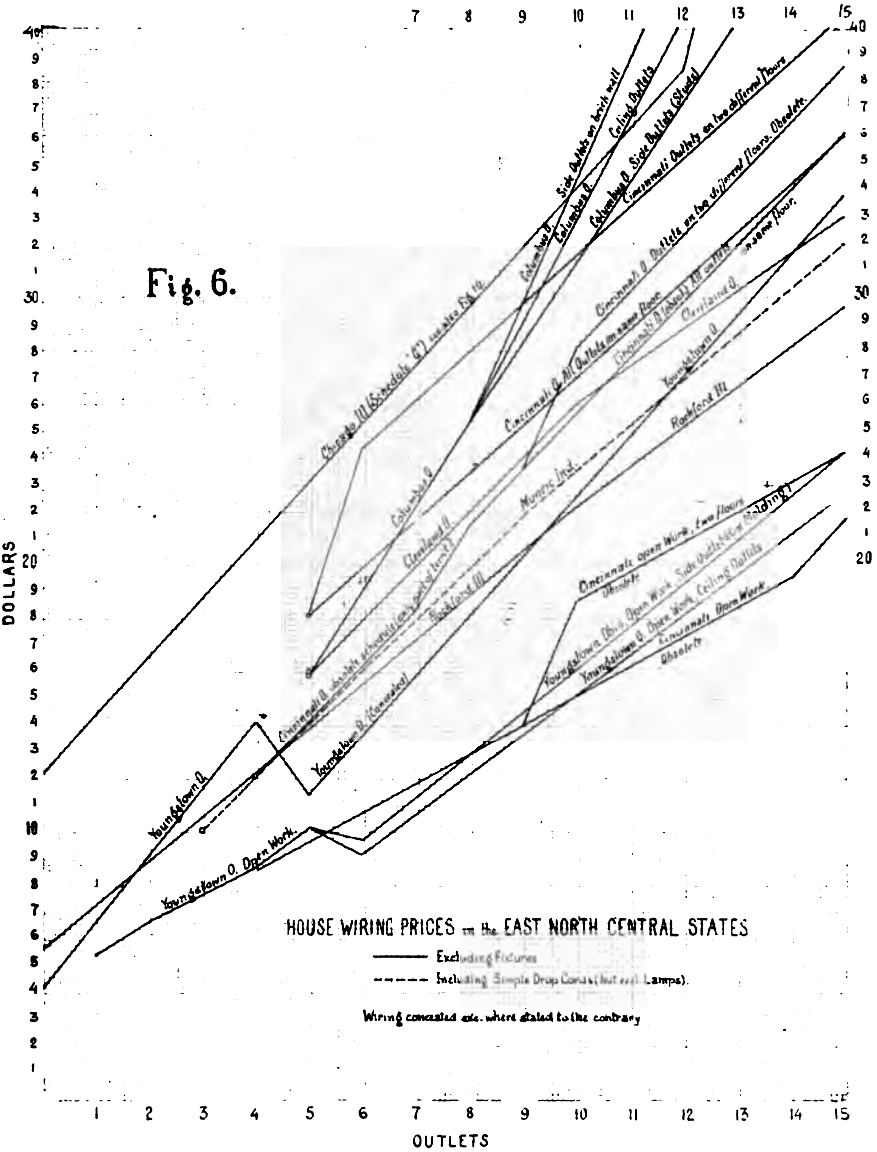

HOUSE WIRING PRICES in the EAST SOUTH CENTRAL STATES and SOUTH ATLANTIC STATES
Heavy Lines: South Atlantic States
Light Lines: East South Central States
Wiring concealed exc where stated to the contrary
DOLLARS
OUTLETS
Richmond Va. Armored
Baltimore Md. Appliance Work (?)
Baltimore Md. 25-38 lights
Baltimore Md. 13-24 lights
Baltimore Md. 13-24 lights
Baltimore Md. 6-12 lights
Louisville Ky. (Concealed)
Richmond Va. Knob and Tube
Franklin Ky. (Net Cash 10% discount on these prices)
Richmond Va. Moulding
Nashville Tenn.
Louisville Ky. Moulding
Louisville Ky. Concealed
Richmond Va. Moulding
Nashville Tenn.
Franklin Ky.
Louisville Ky. Open Work
Richmond Va. Open Work
Louisville Ky. Open Work
Chattanooga Tenn.
Knoxville Tenn.
10
15
20
25
30
35
40
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Fig. 5.

Fig. 6.


HOUSE WIRING PRICES in the EAST NORTH CENTRAL STATES
Excluding Fixtures
Including Simple Drop Cords (but excl. Lamps).
Wiring concealed exc. where stated to the contrary
DOLLARS
OUTLETS
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
10 20 30 40
Side Outlets on brick wall
Ceiling Outlets
Columbus O.
Columbus O. Side Outlets (Studs)
Cincinnati Outlets on two different floors
Cincinnati Outlets on two different floors. Obsolete.
Cincinnati O. Outlets on two different floors.
Cincinnati O. All Outlets on same floor.
Cincinnati O. (obsol.) All outlets on same floor.
Chicago Ill (Schedule "G") see also Fig 10.
Cleveland O.
Youngstown O.
Rockford Ill.
Muncie Ind.
Cincinnati O. obsolete schedule (only part of term?)
Youngstown O. (Concealed)
Cincinnati open Work, two floors Obsolete
Youngstown Ohio. Open Work. Side Outlets (on Molding)
Youngstown O. Open Work, Ceiling Outlets
Cincinnati Open Work Obsolete
Youngstown O. Open Work.

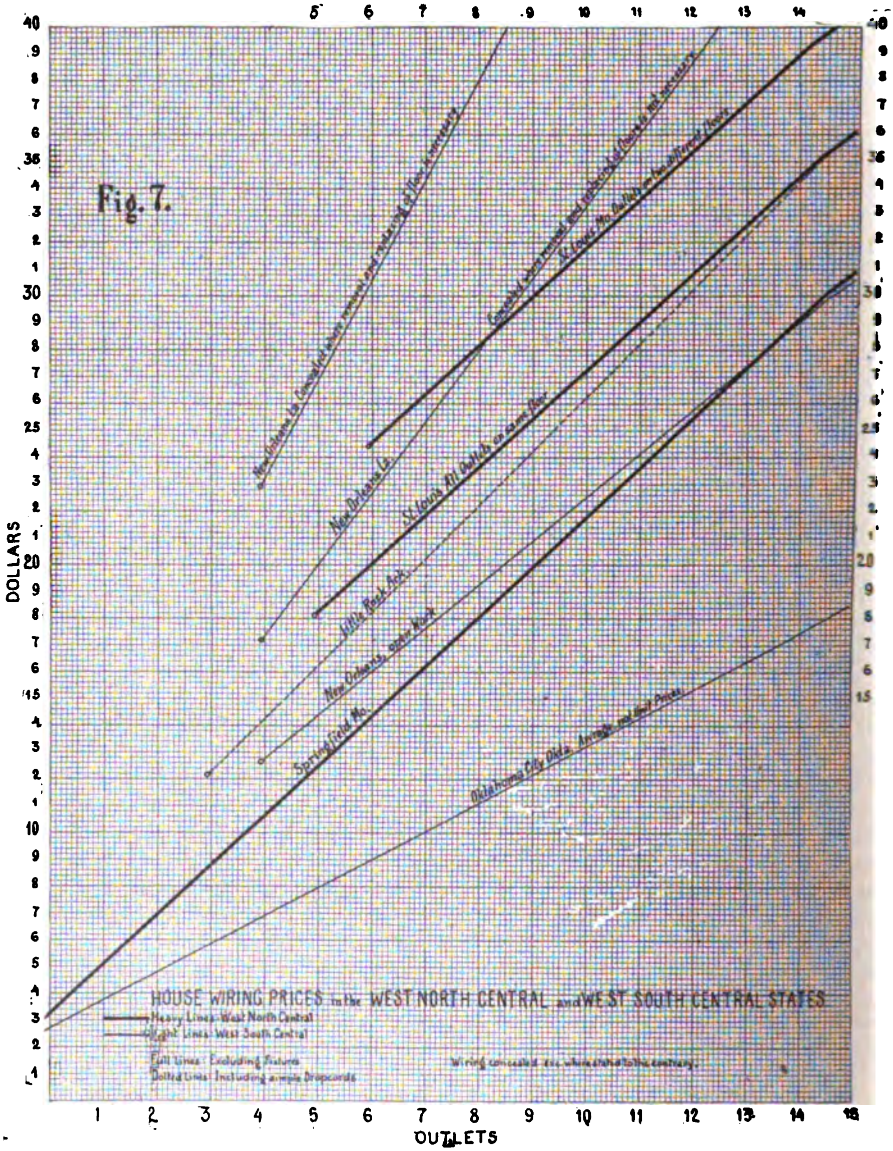

DOLLARS
OUTLETS
New Orleans La. Concealed where removal and replacing of floor necessary
Concealed where removal and replacing of floors is not necessary
St. Louis Mo. Outlets on two different floors
New Orleans La.
St. Louis Ill. Outlets on same floor
Little Rock Ark.
New Orleans, open Work
Springfield Mo.
Oklahoma City Okla. Average and Unit Prices
HOUSE WIRING PRICES in the WEST NORTH CENTRAL and WEST SOUTH CENTRAL STATES
Heavy Lines: West North Central
Light Lines: West South Central
Full Lines: Excluding fixtures
Dotted Lines: Including simple Dropcords
Wiring concealed exc. where stated to the contrary.

Fig. 7.

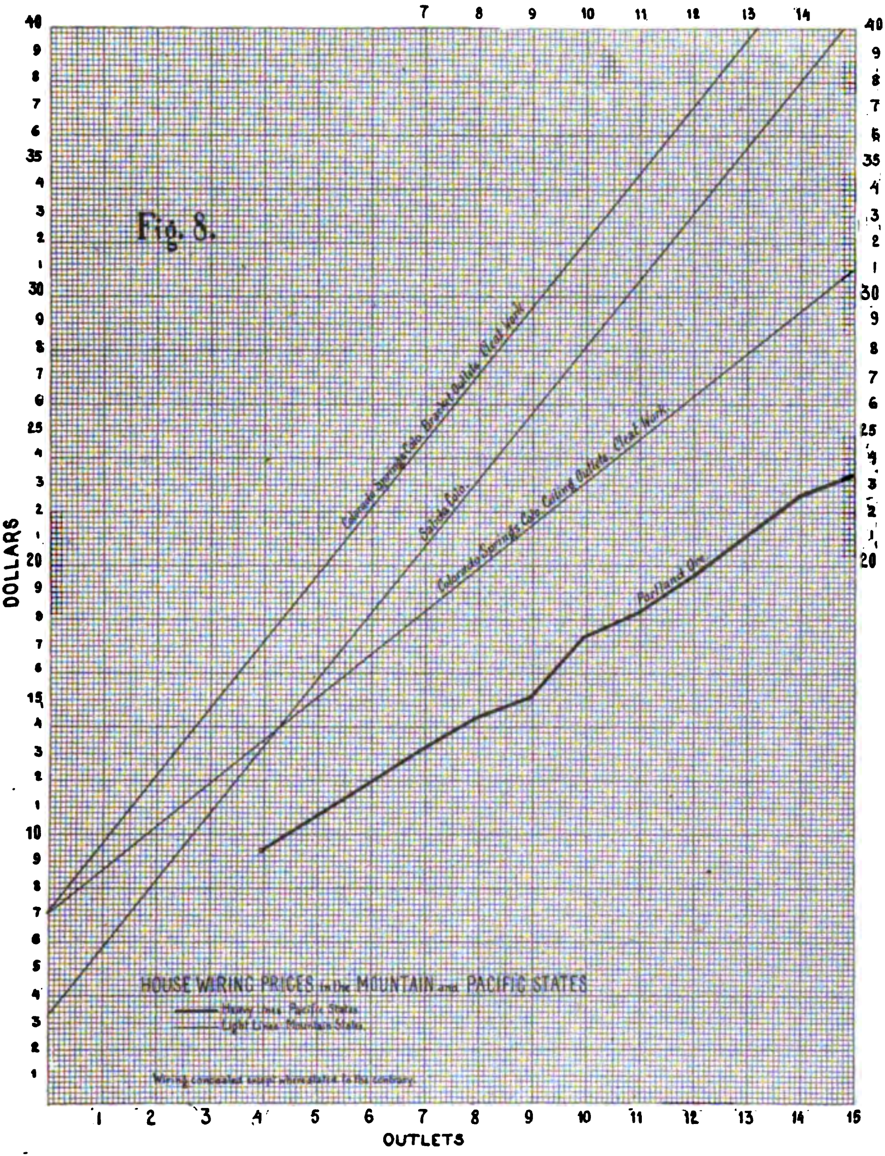
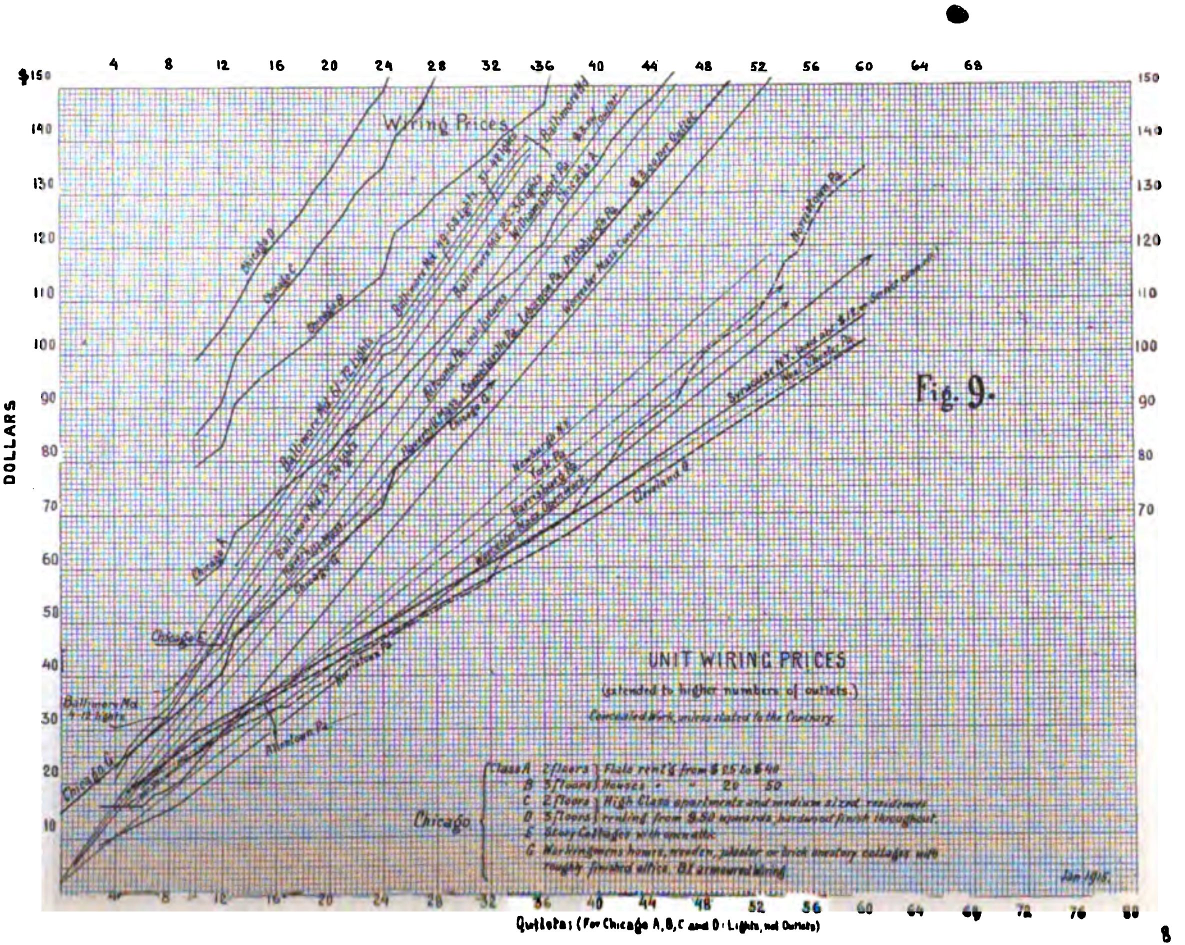


Fig. 8.

HOUSE WIRING PRICES in the MOUNTAIN and PACIFIC STATES
Heavy lines Pacific States
Light Lines Mountain States
Wiring concealed except where stated to the contrary.
Colorado Springs Colo. Bracket Outlets, Cleat Work
Salida Colo.
Colorado Springs Colo. Ceiling Outlets, Cleat Work
Portland Ore.
DOLLARS
OUTLETS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
10
15
20
25
30
35
40



DOLLARS
$150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
68
72
76
80
Outlets (For Chicago A, B, C and D: Lights, not Outlets)
Wiring Prices
Chicago D
Chicago C
Chicago B
Chicago A
Chicago E
Chicago G
Baltimore Md 4-12 lights
Baltimore Md
Wilkesbarre Pa
Altoona Pa
Lancaster Pa
Pittsburgh Pa
Worcester Mass
Boston Outlet
Allentown Pa
Harrisburg Pa
Cleveland O
Syracuse N.Y.
Norristown Pa
UNIT WIRING PRICES
(extended to higher numbers of outlets.)
Contracted Work, unless stated to the Contrary.
Chicago
Class A 2 floors } Flats rent'g from $25 to $40
B 3 floors } Houses " " 20 50
C 2 floors } High Class apartments and medium sized residences
D 3 floors } renting from $50 upwards, hardwood finish throughout.
E Story Cottages with open attic
G Workingmen's houses, wooden, plaster or brick one story cottages with roughly finished attics. BX armoured wiring
Jan 1915.

Fig. 9.

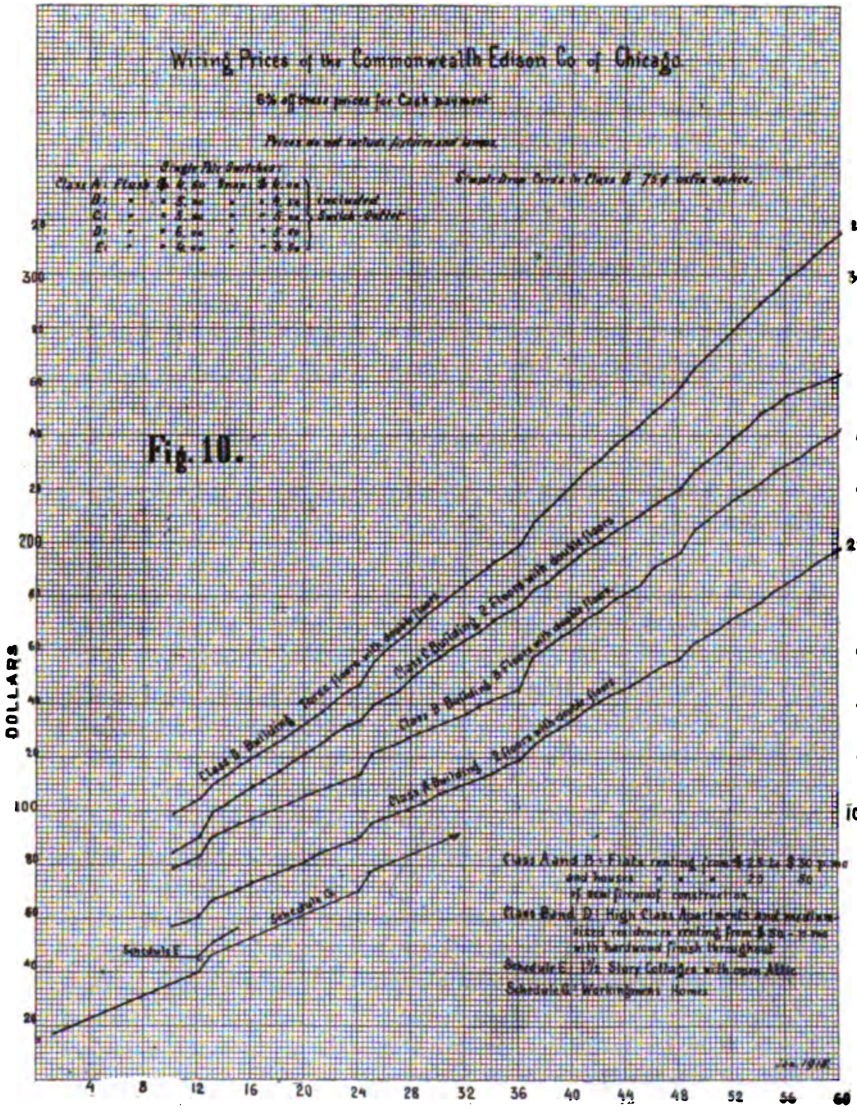


Fig. 10.

LIGHTS; OUTLETS FOR SCHEDULE G

Mr. Jones (continuing): I may say that since the writing of the report the Fire Underwriters have assembled in New York, and while they did not take definite action, they permitted the installation of a number of equipments for observation purposes. The position taken by the chief of the Board of Fire Inspectors in New York City was that he could not pass intelligently on concentric wiring until he saw the fittings used with it.

Chairman Burnett: This report is now open for discussion. I am exceedingly sorry that Mr. Hale was unable to attend this convention in order to lead the discussion. The findings and accomplishments of this most important Committee have been reported upon continuously throughout the year. You have seen references to them in the N. E. L. A. BULLETIN and the technical press, the intention of the Committee being to secure a growing appreciation of the importance of accomplishing its ends.

DISCUSSION

Mr. Doane: I did not come prepared to discuss the report although I find there is a great deal in it that is worthy of attention and study, particularly the tabular matter which represents so much time and labor.

I might say with further reference to the Chairman's remarks concerning the effort that Mr. Hale has made in connection with this work, that he met weekly for a period of six or eight weeks with those particularly interested in this subject, with the idea of finding some way of modifying the complete cycle of the present rules. As the insurance rules read, we could not try out a system of wiring to any general extent without violating them. If we were permitted to violate the rules, then the rules would be worthless, which of course could not be tolerated. The problem that Mr. Hale and this Committee had was to find some way in which we could depart from the rules under such restrictions that the integrity of the rules would be upheld, and in such a manner that the rules could be changed if the experience gained showed it to be desirable. It has been difficult to make arrangements so that the systems of wiring which have been in use in Europe for a number of years and seem to have given satisfaction, could be tried in this country.

To Mr. Hale belongs almost the sole credit for having reached agreement with the insurance bodies, which will permit the making of tests of these other systems of wiring.

As to the standardization work on plugs, it was difficult to get all the manufacturers to agree as to the use of the various patents and so on, so that this Committee could recommend some one type of plug. Here again Mr. Hale has done very fine work, in my judgment, toward an ultimate agreement whereby this Committee can recommend the type of plug to be standardized.

MR. H. R. SARGENT, Schenectady, N. Y.: As a member of Mr. Hale's Committee, I wish to endorse what Mr. Doane has said, since Mr. Hale has certainly made herculean efforts to bring about standardization.

With regard to the concentric wiring proposition, I have just received in the lobby a letter from Mr. Hale, in which he says that Mr. Cole, the chief City Inspector of Boston, is co-operating with him, and meeting him halfway with a view to adopting in Boston some of the new developments set forth in this report.

As you probably know, the manufacturers throughout the country held one or two meetings in New York to consider the general subject of concentric wiring, and I was called upon to appear before them and give a little talk on the subject. I set forth very plainly that the General Electric Company in producing the wire, and attempting to produce fittings, is only doing so at the request of the N. E. L. A.; in other words, we have not tried to force this new scheme. It was also brought out that the original object in considering the use of concentric wiring in this country, was to add to the business of the central stations a portion of the very large number of existing un-wired residences of the less expensive kind which are found in some of our cities. These buildings will not be wired by the owners due to the fact that the present forms of wiring are too expensive, also because in order to obtain a neat job, it is necessary to practically tear the house to pieces, while concentric wiring with the proposed fittings can be installed at comparatively small expense and the installation present a very much neater appearance than any of the present surface methods of wiring.

In view of the fact that this class of buildings is not being wired at present, the business obtained by the contractor in wiring these buildings for the central stations is entirely additional to the contractor's regular business, and does not in any way jeopardize his regular income.

I have in my pocket a number of samples of this wire, and if anybody cares for a sample, shall be very glad to pass it on. It consists of a No. 14 B & S copper wire, 3/64 rubber, a coating of braid, and about 14 mils of copper sheathing, tinned watertight, and measuring over-all about 0.22 inches. At the present time, it is proposed by the Underwriters' sub-committee to limit the use of this wire to branch circuits only and the wire will therefore be available in one size only until such time as the Underwriters are willing to make more general rulings with regard to its approval.

The scheme, as you probably know, is to run the wire around on the surface of the walls at the side of the room trimmings, and it can be papered over, but the Underwriters are very much opposed to concealing it, in other words, putting it below the surface. We are at the same time making tools and dies for simple fittings, so that the material can be easily installed. It is of no value unless it can be easily installed, and that is where its chief merit lies. The wire which you are considering the adoption of in this country is larger and slightly more expensive than the Stannos wire, due to the fact that the Underwriters desire more rubber and an additional braid.

The fittings will probably be finished in the course of three months or so. I doubt whether they will be exploited very generally, but they will be available for any of the central stations if it is desired to make trial installations.

I thoroughly believe that the inspectors in the various cities will give permission to make certain trial installations in buildings which they may themselves designate; and I also believe that the material when installed, if properly installed, and properly grounded, will be entirely safe.

Of course, thus far the householder has been taught to leave conductors alone, and now he is going to be taught that they can be touched with impunity. It is a very radical change, and it may possibly lead in the future to the making of fan motors, flat irons and portable devices of this nature, with one winding grounded to the frame, and with a flexible cord having a second wire which will not be insulated. This will mean polarity plugs, and, in fact, polarity all along the line.

With regard to the plug situation, we have co-operated with Mr. Hale, and it has been a very difficult thing to arrive at standardization, but I believe we have now arrived at a point where we can say that in the course of the next few years a large percentage of plugs, of all detachable plugs, will be interchangeable, so that baseboard receptacles can be bought from almost any manufacturer.

Practically all of the manufacturers will adopt the standard in one form or another. There may be two types of plug for a while, one of the rock-off type, in which the contacts are more or less exposed, and the other of the straight-pull type in which the contacts are not exposed. After that the best form will survive.

MR. E. W. LLOYD, Chicago: I consider the development of concentric wiring one of the most important subjects which has come before this convention the last two sessions. The time is coming, as many of us know, when the small lighting customer will be very difficult to take care of, if we are not able to secure a wiring system that is cheap enough.

There is no desire on the part of any central station men that I ever heard of, to develop a cheap wiring system at the expense of the safety of the public or of property. On the other hand there is a decided trend toward the use of electricity in very small buildings, houses and other places, from which the income to the central station will be small. For the benefit of this class of customers it is necessary to develop a cheaper wiring system and for the central station company to develop a cheaper meter system, or do away with meters altogether.

I think perhaps the first problem to solve is the wiring. This concentric system has been approved in the countries where it is now being used. In the next two or three years I believe we shall find a large movement toward the use of some cheap instrument that will measure or limit lighting service for the small customer at a price the central station company can live on because of the absence of meters and meter reading expense.

As you know, it is very difficult to handle the small house on the present basis. In order to get experience along these lines the Chicago company purchased in England enough Stannos wire to wire a six-room house, not with the idea that our American companies could not develop this wire, or had not developed it, but merely to get the experience. We had the wire installed. The fittings sent with the wire were not permissible under American practice, therefore we made some fittings of our own, and found to our surprise and satisfaction, that they were very easy to make by using the standard fittings of several manufacturers and merely adapting them to the installation.

While we are not as yet able to judge of the general cost per lamp, or foot, or whatever unit you wish to use, we are confident that the cost of the installation of concentric wiring is very materially below that of existing approved methods. We have not as yet received the definite support of the Underwriters in Chicago or of the City Inspection Bureau, but we hope to work with them with the idea of developing this system.

I want to repeat that I consider this development of extreme importance to the central station industry all over the country. While our friends on the Pacific Coast may not be greatly interested at the present time, I think they will find, even with the large percentage of people using light on the Coast, that this new wiring will aid them in many directions.

As far as the standardization of plugs is concerned, I think we all believe alike on that subject. In many communities the development of electric heating and cooking is improving very fast. As you realize, there are communities in this country that have no other means of increasing their revenue than through the use of electricity for cooking purposes. Small communities are found in many States where no gas is in use, and where there is very little use for power, because of the lack of manufacturing. These small companies, I think, can increase their income by the use of electric devices as these develop; but one of the main things to establish as soon as possible is the standardization of plugs, and I hope that the Committee will be continued, and do what work it can toward accomplishing this during the next year.

Mr. Theodore Zeigler, Oakland, Cal.: I am not prepared to say very much, but I have been with you gentlemen from the East for the last two or three days, and I am sorry to state that the Coast representatives have not said very much. We have listened to a good deal, and still there is always room for some question. You people who live in the East do not realize the difficulties we have in the West. The western people expect a great deal for little money, but I presume that is the same East as here.

The gentleman from Chicago mentioned cooking by electricity. That is one of the most lively questions in the western states to-day, especially on the Coast. Cooking by electricity is discussed among the men of the Pacific Gas and Electric Company but no one is able to deal with it at present.

In regard to rates, I would like to ask the gentleman from Chicago, what the rate per kilowatt-hour is in that city. There is still another question of importance to us here in the West, this wiring of small homes. We have many such and I hope this new wiring will prove to be practicable and that we shall be able to use it here. If allowed to do so, it will be a very good thing for our electric light companies.

Mr. Jones: As a layman, noting the views of this report, I can say that we are trying in the East to get the concentric wiring adopted. We are up against the fact that we have no fittings as yet to show the insurance people to get their approval. As soon as fittings are ready we shall have something concrete to present for approval. Up to the present time we have talked about something that exists in Milan and Strasburg but not in America; and we are in the anomalous position of asking the Underwriters to approve of something that has not been made.

Mr. A. J. Cantrell, San Francisco: I would like to ask about this concentric wiring. I believe it has been tried out in Germany and England. How long has it been in use there, and what success have they had with it.

Mr. Doane: It was adopted in Germany about 1907, if I remember rightly; and before the war I had a report to the effect that the Siemens and Halske Company, which had been the principal producer up to that time, had sold upwards of two millions dollars worth of the wire and material during the last year. It is very generally used, as is indicated by these figures.

Mr. F. H. Woodward, Oakland, Cal.: Just one question. I saw in the *Electrical World* about five or six months ago that the basic patents covering concentric wiring were held by two men and were taken out some twelve or fifteen years ago. I would like to know if the Committee can inform me in regard to that matter.

Mr. Sargent: Our patent department has ruled out a number of patents which go away back on exactly the same thing, and we have reason to believe that there are no patents in this country on that sort of wire.

Now, in connection with the question asked by one of the speakers and Mr. Jones' reply, I want to state that I have here a sample of this wire, which is very similar to the wire used in Germany. It has a seamed rather than a socket joint. This has an open seam.

So far as the patent situation is concerned, I think there is nothing to fear.

CHAIRMAN BURNETT: A motion to accept this report and have it appear in the printed proceedings will be in order.

(Motion made, seconded and carried)

CHAIRMAN BURNETT: I wish to take advantage of this opportunity to bring up a new matter.

Article VII of our constitution provides that at an executive session of the Section to be held on the second day of the annual convention there shall be appointed by the Chairman of the Section a nominating committee to be composed of five members of the Section. In accordance with the constitution I now appoint on that Committee Messrs. Learned, Walton, Gale, Callahan and Franklin.

(Adjourned)

FOURTH COMMERCIAL SESSION

THURSDAY MORNING JUNE 10

CHAIRMAN H. A. WAGNER: The fourth Commercial session will please come to order. We will now proceed with our program, beginning with the report of the Rate Research Committee, Mr. R. S. Hale of the Boston Edison Electric Illuminating Company, Chairman. Mr. Hale is not able to be present, and Mr. E. W. Lloyd, a member of the committee from Chicago, will read the report.

REPORT OF THE RATE RESEARCH COMMITTEE

The Committee has done comparatively little work during the past year, due to the fact that there has been very little development in the industry that called for anything except possibly a restatement of the fundamental principles and a reference to the methods already developed and in use.

A short review of the past may here be in order to bring home more clearly to members the methods and principles by which they have in the past correctly developed the broad outlines of their now existing rates. The opinion of the Committee is very strong that while refinements would have been possible, yet, on the whole, the industry has used the correct principles and developed rates that are for the advantage of the public.

Electricity was first sold for street lighting at a price per lamp per year. When the inventions of Edison and others made electricity possible for store and house lighting, the same method of prices per lamp per year was still used, but the amount of the charge was made a different amount if used for house lighting instead of street lighting, and in addition it immediately became necessary to establish meter rates in order to get this class of business in competition with gas and oil, although the rates per lamp per year were retained substantially for street lighting.

The meter rates were set so as to get the store and house lighting, and yet not seriously to impair the income until the growth of the business should warrant general reductions to both classes.

Next, the possibility of selling electric power appeared, and again it became necessary to adopt power rates that would get the power business but not seriously reduce the income from lighting. Even at this time it was recognized that it was better to take a power customer at the power rate without regard to whether he used current at peak hours than not to take him; and also, even at this time, it was recognized that a customer using light in summer only was not entitled to the power rate even if he stayed off the peak.

At the same time or shortly after the adoption of power rates, the principle of "wholesale" appeared. This was when analysis had shown the immense difference in unit costs between large and small quantities, and that unless the large users were given a lower rate than had hitherto been given to small users the business could not be obtained.

The same analysis showed that if such wholesale users were offered a rate that would secure their business, then the increased size of the whole plant and the augmented output resulted in investment and operating costs so low as to permit of making a low rate to the wholesale users without loss, and of reducing the rate to the retail users as well. The rate to the retail users soon became much lower than if they alone were supplied although not as low of course as the rate to the wholesale users.

It may here be noted that the above principle of wholesale applies almost entirely to cases where the wholesale delivery is at a single point without further expense for additional distribution. When the wholesale is merely the bookkeeping aggregate of numerous retail deliveries the principle above noted applies in a much lesser degree.

The various rates for general industrial purposes, such as for ice making, heating, charging electric batteries and irrigation, and the numerous class rates that now exist in our industry, have all been developed by the same principles that have given us our street lighting, general lighting, and power rates; each being developed when the opportunity arose for supplying a new class of service that could not afford to take electricity at the old rates, and yet under conditions such that if they were supplied at a rate they could afford to pay, (even if the rate to the other classes were not at once reduced), the general result would be to the advantage of all.

Some of the differentials thus developed were based on the fact that a customer who used his lamps but few hours could not afford to pay as high a rate for each lamp or unit of demand as the customer who used his lamps continuously, and also that such a short-hour user could afford to pay a higher rate than the long-hour user for each kilowatt-hour or unit of his consumption.

The principles set forth in the papers of Hopkinson, Wright, Doherty and others had shown that the total station costs depended largely on these factors of consumption and demand. As the increment costs of a station, or the minimum rate below which a station could not afford to go, also depended largely on the consumption and on the demand used at the time of station peak, and as the customer's own costs or ability to pay also depended largely on his consumption and demand, these principles of consumption and demand or consumption and readiness-to-serve made it possible to get along in our industry with a less number of classifications than in railway service or postal service. For instance, the application of these principles in some cases enabled us to supply short and long-hour customers on the same lighting schedule or same power schedule, especially if supplemented by a recognition of the principle of wholesale, although not always to supply all customers, whether light or power, on the same schedule.

It will probably never be possible for us to get along entirely without classification into power, light, street lighting, railway, ice making, etc, particularly when it is remembered that the readiness-to-serve (or to be served) may in only a few cases be measured electrically, the element of time of demand being also important. It is often measured by number of rooms or area lighted, or by sockets, and even when measured electrically different rates are chosen for different kinds of business.

At one time it was thought possible that the readiness-to-serve principle might enable us to compute the rate for any particular customer or class of customers by using the customer's electrical characteristics alone (as demand, amount of consumption and time of use), but this has been found to be impossible, and the old principles used when developing the commercial lighting and power rates have still to be used for any new kind of business.

If now we should attempt to segregate the principles that consciously or unconsciously have been followed to get these results, we find the following:

I The total net income of the company must be enough and no more than enough to give a fair return on the investment and attract capital freely to the enterprise. The gross earnings from the sale of the product must therefore be sufficient to cover all necessary expenses of operation, including taxes, bad debts, etc, a reserve for renewals and contingencies, interest at current rates and a reasonable profit in addition.

II When conditions are the same, rates to different customers or classes should be the same but need not necessarily be the same when conditions are different.

III No rate should be below the bare cost, i. e., below the expense involved solely by adding that customer or class, including a fair return on any investment added or used exclusively for that customer or class.

IV Rates should be such that as many customers as possible may be served at as low rates as possible, and yet the business as a whole furnish a fair return on all the investment.

V No rate can be above the value of service, otherwise the customer will not take it. . . . . .

VI While customers whose circumstances are alike should pay the same rates, it is not necessary that customers whose circumstances are unlike in respect to the amount their class can afford to pay, should be asked to pay the same percentage on the investment they use jointly, especially when they would not take the service if asked to pay such rates, but on the other hand, would take the service and pay something toward the fair return on the whole investment if offered rates they could afford to pay.

Those who have read our previous reports will remember that we do not approve the application of value-of-service in any such way as to get more than a fair return on the investment.

These principles we believe not only explain in general the rates our companies have made in the past but also give the exact consideration to costs that is necessary, while yet encouraging companies to take on new business that will reduce their average costs and thus warrant reduction in rates to all classes.

Unless companies are encouraged to keep all their investment in use irrespective of the percentage of return that any particular customer or class pays on the investment he or it uses jointly with others, the rates to the classes that do take the service will be higher than is otherwise necessary.

These principles have been the foundation of practically all rate developments, not only in our business, but in such business as the postal service, railroad service, etc, etc.

In addition, however, to the need for new rates to get the business of new classes such as commercial lighting, power, street and steam railroads, ice making, etc, the increase in lamp efficiency in the last decade, as brought out in the paper by Mr. Doane a few years ago, has forced on our industry the possibility, which may become serious, of the new lamp taking so few kilowatt-hours that the income from house, store and other retail lighting will be seriously affected, and when this happens the expense for distribution systems, meters, etc. for such business will not be correspondingly reduced. In such a case electric companies could not afford to make any extensions or take new lighting customers unless rates were increased.

A parallel case would arise in the post office if some one should invent a printing typewriter, so that all letters could go as printed matter for one cent, thus reducing postal income without correspondingly reducing the expense. Another case would be that of a railroad charging by the mile, yet reducing the number of miles travelled in order to provide a given service, and for this purpose constructing a very costly cut-off which actually adds to its expenses.

In many of these cases there are two solutions possible. One, that the improvement may be so great as to develop enough additional business to make up for the immediate loss of income; the other, an increase in the apparent rate per kilowatt-hour or per mile, even if the price for the service (as for a given amount of light or the carrying of a passenger between two points) is less.

If neither of these solutions be possible, the improvement may result in a serious loss of income. enough so to justify the parties interested in refusing to make it.

That there has been no check to the development of the tungsten or mazda lamp but that on the contrary every effort has been made to give the public full and immediate advantage of the improvement is because the men in our industry have believed that a fair solution will undoubtedly be found, and yet the danger is a serious one, and one which has called for much deliberation on the part of the Committee.

Few companies have yet found it necessary to raise lighting prices, though it has been reported that some municipal plants have forbidden the use of efficient lamps. On the other hand, any company having now in mind the reduction of its price for lighting should also keep this possibility in mind, and should remember that the efficient lamp must of necessity reduce the income from the present wholesale lighting business, since the kilowatt-hours used for the lighting formerly done by the carbon lamp are being reduced, while the wholesale rate cannot be raised above what it would cost such customers to supply themselves from their own plants.

This subject is still before the Committee, is in fact before every company affected, and we are glad to say that our sister Association of Edison Companies has also appointed a committee to take it up actively.

The foregoing gives a general view so far as the broad principles of the present situation are concerned.

Many other questions are coming up from time to time, such as the exact figures of rates that will give the best results, and also what total income will give sufficient return on the investment to attract more capital into the business. With these two questions the Rate Research Committee does not deal, but others of details such as minimum charge, amount of deposit reasonable to require, etc, are before us. These have already been considered by Commissions, and in our weekly publication of *Rate Research* we have endeavored to lay the results before you.

In this connection we desire to call your attention to the general soundness of the Commission decisions, at least so far as relates to that portion of the rate question with which our Committee deals. This Committee does not concern itself with questions of what constitutes investment or a fair rate of return on the investment, but only with questions of relative rates for different classes of service, and so far as these go the decisions of the commissions have, on the whole, been sound. In certain cases where there have been reports to the Commissions calculating rates for classes of customers much higher than were necessary, the Commissions have modified these calculations by the principles noted above, so as to give rates that would really develop the business.

Turning now from the principles of rate making to the form, a great deal of our work in past years has been in the suggesting of standard forms of rates. The actual or total amount of rates is beyond the province of this Committee. What classifications each company should adopt depends on local circumstance, so that each company must decide for itself on these, although the Committee may properly give its advice when asked. When, however, two or more companies have decided on the same classification either in whole or in part, it is desirable that such portions of their rates as apply to the same classes should correspond in form and, so far as practicable, in wording, even if the figures be different. The forms suggested in our earlier reports are gradually meeting with acceptance, especially whenever companies revise their schedules.

From time to time it may be desirable to propose changes in our suggestions for standard forms, but we do not consider it desirable to offer any modifications at this time. Within a year or two, when more companies have adopted the general standard, there will be opportunity to determine what further changes should be made in these forms so as to make it easy for companies in different localities to have rates as nearly as possible the same in form, while still taking account of local conditions.

RATE RESEARCH

The Committee has continued the publication of its weekly paper, *Rate Research,* throughout the year with William J. Norton as its Editor and Stella Ford Walker as Associate Editor.

No effort has been made to push the subscription for *Rate Research,* the Committee preferring to merely offer it to such company members as have a direct use for such a publication.

The paper carries no advertising, and during the year has suffered somewhat from the general financial depression, in that about forty cancellations of subscriptions were made in the fall of 1914. This loss has been partially made up, the paper now having 423 paid subscriptions as against 454 at the time of last year's report.

The receipts and expenditures for the three years of the publication have been as follows:

Receipts 1912	$2,347.87	
" 1913	3,878.19	
" 1914	3,720.06	
		$9,946.12
Expenditures 1912	$1,005.13	
" 1913	4,190.73	
" 1914	4,707.82	
		$9.903.68
Balance		$42.44

Amounts due at the first of the year for unpaid subscriptions, bound volumes sold, and inventory on hand showed additional assets of approximately $1200.

While the Committee has always been able to meet the running expenses of the paper without calling upon the Association for assistance, this has been due to the fact that subscriptions are paid in advance, and strictly speaking the publication is not yet upon a self-supporting basis. One hundred additional subscriptions, however, will put the publication in a strong position financially, and the Commercial Section has very kindly agreed to make the effort during the next six months to secure these additional names.

FUTURE WORK OF THE COMMITTEE

In view of the fact that the principles of rate making appear to be well established, at least so far as the practice of the companies and the decisions of the Commissions are concerned, we recommend that our Committee be either discontinued or continued merely for the purpose of publishing *Rate Research* and placing before the Association the various decisions and reports of Commissions and courts, etc, with the idea that the Executive Committee shall re-appoint or appoint a new committee should further developments warrant it.

R S Hale *Chairman*
L H Conklin
Alex Dow
R G Griswold
W H Johnson
J W Lieb
E W Lloyd
W J Norton
N T Wilcox
W H Winslow
M S Hart *Secretary*

DISCUSSION

Mr. J. E. Kearns, Schenectady: I would like to ask why the various operating companies in suggesting rates do not make an effort to get away from the use of "so much per kilowatt-hour," and put the matter on some different basis. There are many people who do not understand the term "per kilowatt-hour." For example, take the use of, say, a washing machine. You put that on your system, and, while the additional energy required is a small matter, practically nothing, if you read it from your meter and put it in the bill at so much per kilowatt-hour you make it unnecessarily prominent. It seems to me that if some simple arrangement could be made for such service it would open up a larger field for some of these appliances, especially the heating and household utensils. Why not go to a home and say: "In addition to the usual cost for light we will gladly let you operate a washing machine any time during the week for an additional charge of twenty-five cents." I think we would get a good many washing machines on the line at that rate, and really, in 90 per cent of the cases, twenty-five cents would more than cover the cost of the energy used, even though it were sold at a rate of ten cents per kilowatt-hour.

CHAIRMAN WAGNER: The Chair does not wish to take any part in this discussion, but in order to get further suggestions from Mr. Kearns I would like to ask him to tell us how he would make this charge, whether he would connect the washing machine outside of the meter, or would connect it to the wiring of the house inside of the meter, and how he would deduct the killowatt-hour record of the meter from the bill and substitute a charge of twenty-five cents.

MR. KEARNS: In answer to the question raised by the Chair I will say that I believe a great many of the operating companies are making a mistake in the way they charge for current, especially in residences. Now, I am talking as the representative of a manufacturing company and not as a central station man. I have not tried to sell current to private houses at all, and I am simply judging the situation as I see it. The method of sending a man around every month to read meters is all wrong. It increases your overhead charges. It puts the families to some inconvenience in a large number of cases. I believe that if a careful record were made of the actual income from residences on the meter basis it would be found that they average very nearly the same per month throughout the year. If you would take a reading from the meters once every three months you would be in just as good a position as you are today.

In view of this it seems to me that you would be able to take care of the extra charge for a washing machine on the basis of say twenty-five cents a month extra, allowing this additional energy to be read on the meter. It is easy to determine from the motor rating the additional energy that this washing machine will take under average conditions, and that could be deducted from the usual increase that would be expected if you were giving it on a straight rate basis.

MR. B. E. HANNON, Sacramento: For many years in Sacramento we operated under a flat rate. Last month we were getting four mills and about a year ago we were getting a mill and a half per kilowatt-hour. We found there was no device that we could put on, with the exception of an interrupter, that would prevent people from putting on heaters in the winter when our load was heaviest. We had in all about five years' experience with flat rates and are now putting in meters. We are mixed up with the State Commission. It will be necessary for us to take the matter into court and have the court decide whether or not we may put in the meters.

MR. G. S. PEARSON, San Francisco: We have had quite a little experience with this flat rate proposition in the sale of electric irons. We sold electric irons with an additional charge for current of fifty cents per month. It cost us more for service inspection than it would have cost us to read the meters. In fact an average consumer will dodge the inspector. I have one case in mind where I was canvassing a district for residence light customers and they thought I was an inspector on the flat rate. One woman dropped her hot iron into a basket of clothes, and consequently the fire department came out. I found that in this same district, when I would call at one house to see about the electric iron the woman would telephone to all of her neighbors, and when I arrived there would be no electric irons in sight.

MR. HENRY W. PECK, Schenectady: I think there is one general answer to Mr. Kearns' suggestion, and that is that the more devices we have in customers' houses the less likely we are to have complaints against the bill. If they have lamps only they are continually watching the bill. If it is a little high they say they have been using the same amount of electricity and that there must be something wrong with the meter. If they have an electric iron or a percolator, a toaster or a washing machine, or any of the other devices, they will think that there must be something wrong with one or the other of them, and that it is possible they may have used the washing machine longer or had the percolator or the teapot going a little more for afternoon tea, or something of that kind. That is the experience we have had, and I think it in a measure answers the suggestion made by Mr. Kearns.

MR. GEORGE B. JOHNSON, Chicago: A number of years ago we in Chicago had flat rates, and we found that people used the current carelessly, letting their light burn all the time. The result was that we lost a lot of money. The only scheme we could devise at that time was to put in patrol boxes which were controlled by our outside men. A certain number of lamps would be turned on from dusk until dark, and so on, and in that way we could control the consumption of electricity under the flat rate. The next move was to take out these boxes. Then we found that they began to waste current again, so we put in meters. Our effort then was to convince our customers that the meter was the better method.

In regard to residential customers I agree with the gentleman who has just spoken, that where there are a number of different appliances in use it is easier to control the situation.

MR. HAROLD ALMERT, Chicago: Everybody knows who has had occasion to study the question of rates, that the work of the Rate Research Committee has been the only digest or index for quick reference to decisions in various parts of the country. I should regret very much to have the publication of *Rate Research* discontinued at this time. If it is in order, I should like to recommend that the work and the publications of the Rate Research Committee be continued for at least another year.

(Motion seconded)

MR. S. M. KENNEDY, Los Angeles: I should like to ask Mr. Lloyd as the representative of the Rate Research Committee how a condition like the following can be justified. I find that there are a variety of opinions on this particular subject. Suppose that a central station is generating power and putting it on its switchboard at one cent a kilowatt-hour, under conditions of operation which would make an annual load-factor of 35 per cent. What justification has such a station for selling power to a consumer with a 75 per cent load-factor basis at eight-tenths of a cent. This subject has been under discussion among the power companies of my State, and there is a great difference of opinion even among the experts as to whether or not a company has a right to sell energy at less than its average station cost.

MR. LLOYD: I think the question is a very important one and I also think it is rather easily answered. Perhaps a concrete example would explain it better than a general discussion of the point. We had a similar problem under discussion in Chicago when we went after the ice business. Our first effort was to determine from the best available knowledge of refrigeration what it really cost to make ice in our latitude and location. We found that with electricity costing one cent per kilowatt-hour we would have no difficulty in getting the ice business in Chicago. That conclusion was amply justified by the conditions that followed, and at the present time we have something like nineteen plants making about 300 000 tons of ice per annum.

In determining our ability to make the rate of one cent per kilowatt-hour for that business we were met by the same question. At that time there was no commission in the State of Illinois, but, looking into the future, we have always endeavored to work just as though we did have a commission and were under its supervision. In making our analysis of the ice business, we found in the first place that it was the most desirable off-peak load we could possibly find anywhere. The cost of producing the energy, and the income from taking a business of that particular class were analyzed very carefully and we found that without any difficulty whatever we could afford to cut our primary rate in two. Presuming that we had a regular rate of $25 per kilowatt—it was lower than that in the case of ice plant companies, because the load-factor is high and the demand is high, 300 kilowatts or more —we found that we could reduce the supposed $25 primary charge one half, in fixing a rate for ice making. That I think is an answer to Mr. Kennedy, namely that in taking on this additional business of large size we can make other rates.

We must however in all cases study the increment costs that go with the business. In order to make this point much clearer in your minds I would refer to an article which appeared in the engineering magazines last year along these same lines. It gave one instance where a company in western Massachusetts had taken on 2000 kilowatts, somewhere around 30 to 35 per cent load-factor, at an average rate of two cents, as I remember it. There was a certain large mill in the immediate vicinity, and the increment cost in order to get that business was relatively small. On the other hand, the rate, as I remember it, was not much over a cent per kilowatt-hour, and the result was that at the end of the year the annual statement, their net figures, showed a very decided gain because of the acquiring of this business.

I think all operators of properties realize that condition very thoroughly, and that they can easily prove through their annual statements of costs and income that the securing of one large business in the smaller communities will show very fine results for the stockholders, and possibly a reduction to the general public. If I have not answered the question clearly I shall be very glad to go into it further.

MR. M. C. OSBORN, Spokane: In answer to Mr. Kennedy I would say that if you can secure a customer at eight mills with 70 per cent load-factor as against one cent with a 35 per cent load-factor, you really cut your overhead charges in two. With 35 per cent load-factor you have a revenue of $30.24 per kilowatt year, while with 75 per cent load-factor you have a kilowatt year of $44.38. The difference I think, is justification enough for granting the rate of eight mills to the larger consumer.

MR. W. W. FREEMAN, Cincinnati: It occurs to me that in undertaking to answer a hypothetical question such as has been submitted by Mr. Kennedy we may possibly get into hot water. My notion would be that the answer to Mr. Kennedy's question might be "yes" or "no," and perhaps it is hardly safe to indicate whether it should be yes or no. I recollect very clearly a discussion with a prominent financier of New York a good many years ago on this very question. I was very much inclined to flatter myself on having closed a large contract, and did not expect the question from him as to what the rate was, what the average cost to the company of the current was and so on, and following that the question, "Can you afford to sell current for less than it costs you?"

I believe fully in what Mr. Lloyd has said. There are many cases where a large block of business can be taken at a price much less than the average cost of the energy supplied by the company, and be distinctly remunerative. In other words, this switchboard cost of one cent that Mr. Kennedy refers to is made up of a number of elements; some of them may cost one and a quarter or one and a half, and some of them may cost five mills, or less, the average being one cent. If you take on additional business below the one cent cost, and as much below as possible, you necessarily reduce the average substantially, and it is profitable to do so, because you will find that when you take on this low rate, high grade business, if I may so term it, you are able to maintain the percentage of operation cost and income, notwithstanding the fact that the large business is taken at less, in many instances, than the average cost. I think, however, it would be a mistake to assume, because that is true, that it is necessarily true in all cases. It occurs to me that possibly it might not be wise to answer in the affirmative the suggestion offered by Mr. Kennedy, without a little more information. If this is a matter of investigation, and the rights of the company are involved, there may be elements in the case that would not appear on the surface. It is unmistakably true in many instances of the acquisition of large business with a high load-factor, the low-rate business is the most profitable business a company could secure. It does not follow necessarily that the business is profitable because the rate is low, and it seems to me that each case should be analyzed pretty carefully by any company before according it, in order to be sure that it is right.

Perhaps a concrete example of what occurred in one eastern central station might be of interest to you. We had occasion to visit a very large plant after a boiler explosion. The plant involved some 6000 horse-power. They had a high load-factor which ran close to sixteen hours a day. We endeavored to get this business, a business which included a labor schedule up to five o'clock in the day, based upon a regular schedule in which the fixed charges of our operating and generating plants were included, and the rate for such current supplied was prohibitive. We then said to the president of the firm that if he could arrange the labor schedule so that the hours of labor of the employees engaged in the manufacture of the product made by them could be reduced to 4:30 daily, with a Saturday half holiday the year around, additional time added to the Saturdays, we then could give him a rate which would enable him to shut down his power plant. He considered that proposition and the result was we signed a very profitable long-term contract which gave us an opportunity to supply this current off our peak. In fact, the 5000 kilowatts were taken on without a single change in our generating equipment, and without a single addition to the labor equipment in the generating station, the only investment involved being the coal necessary to increase the station load-factor.

Now, it is equally true that the addition of such business to a central station load reduces the average cost of power generation in the station. You might carry it on indefinitely and take on enough business to bring it back up to where it would be on a peak basis. That would necessarily mean that our average rate would be very materially lowered, hence to say that a central station should not sell current below its average cost is to exclude what to our minds is the most profitable kind of business we can have.

The Commission of New York has brought out the very point that Mr. Kennedy suggests. It figures the total cost of the total kilowatt-hour output, decides one by the other, and states that such a cost must necessarily prevent a sale below that cost. The only difficulty arises when it comes to an investigation of your rates. How you are going to segregate your cost and your charges to each class of business. I do not think any of us know exactly what it costs to serve each class of business. Unless we do we are in a rather embarrassing predicament in establishing this or that charge for generation. The best we can say is that we know certain classes of business, such as the concrete example I have cited, can be taken on at a profit, which in this particular case is really above the cost of generation.

Mr. Arthur Williams, New York City: Stated in a different way, from the very clear statement made by Mr. Freeman, it does not necessarily follow that increment cost bears any relation to average cost at the switchboard. The increment cost may be more or may be less, depending on the load-factor and possibly other conditions. I have not heard the problem more clearly stated than as explained by Mr. Freeman.

A good example of the effect of the load-factor upon income is found in the following illustration: A kilowatt-hour, with 100 per cent load-factor yearly use, becomes 8760 hours, and the income for each kilowatt of maximum demand at one cent per kw-hr would be $87.60; but take a residence customer, whose average use of the demand is one hour daily; here we get an annual use of 365 hours of the demand, which, even at a rate as high as 10 cents per kw-hr, yields an income of only $36.50. Thus, with 100 per cent load-factor at one cent, an income of $87.60 is derived, while with an average daily use of one hour at 10 cents, the income per kilowatt of maximum demand is only $36.50.

There is a growing tendency all over the country toward large units in building construction. We see it in even the smaller cities. That is to say, everywhere we are getting away from the small to the larger buildings. It seems to me that if the community is to be served as a whole, the rate schedules of a company must be such that it can take in the largest as well as the smallest consumer. If you do not take the large consumer, you do not best serve the small consumer, in that you have deprived him of a possible reduction by the economies which come from an increased service and improved load-factor. The obligation upon the supplying company to secure the large consumer, is, it seems to me, no less than to take the smallest consumer in a community.

The question is often presented as to why a so-called extreme difference can be made between the schedules given to the small consumers and the large consumers; why there should be a difference, say, between 10 cents per kw-hr and 3 or 2 or even less than 2 cents. The natural result is the creation of some prejudice against the supplying company, and the public gets the idea that in this there is an element of discrimination and unfair treatment. The comparison often forms the basis of an agitation against the high rates of the company, the public not understanding that even at these high rates probably no company—certainly no company serving a large community—avoids considerable loss in serving a large number and a large percentage of its small consumers.

We do not find, or at least do not often find, similar questions arising as to the difference between railway rates and the usual commercial rates of the supplying company. A railway rate may be, say, 1 cent per kw-hr or perhaps slightly less, and yet seldom, if ever, does this difference seem to cause agitation or create prejudice. But prejudice and agitation are threatened even where the rate to the large commercial consumer is as low as 3 cents. The reason for the railway differential is readily grasped, and it occurs to me that, as we have created a distinctive class for this service, so we must create a second distinctive class for large building service. In doing this, the explanation for the differential would not be based upon such items as metering, bookkeeping and kindred matters, but upon the assumption that the second group, comprised of large buildings, constitutes a power class by itself, quite as distinctive as the railway service—comparable, say, with the Niagara Companies, which, though supplying great quantities of energy, do so to but comparatively few units.

In the assumptions relating to this class of service, it would seem but fair to include the individual investment and operating costs; though included individually the result, of course, could be averaged within the group as a whole. Here, as with railways, it will be assumed that the underground system would connect directly between the generating station and the consumer, and that the costs of this group would be individualized, so as to be exclusive of those general costs which relate to the service to the community as a whole. It is not suggested that the group be actually segregated, either from the general net-work or the general organization of the company, but that the investment and the operating costs of the groups be segregated, and, in fairness to all, placed upon the best theoretical basis in determining the fair cost of supply.

It will be found that a single small consumer will usually take a great deal more of the company's attention than the largest consumer; that organization expenses, advertising agency expenses, a large percentage of the expenses of the accounting force in the fiscal departments and the organization of the operating departments are very largely—probably to an extent of from 90 to 95 per cent of the total—devoted to the service and needs of the small consumer. In accepting this point of view we would place our wholesale or large power service in a group corresponding to the railways, and group practically three instead of two classes—(a) railways, with their attendant costs and proportionate rates, (b) the large buildings, likewise segregated in all respects, and (c) the great body of small consumers, for which the general system and great overhead organization of the company must be created and maintained. While each group can be considered as though it were conducted by a separate corporation, yet all are benefited by merging them, and making a unit of the investment, administration and operation. This combination should be made of benefit to the service as a whole, and not a detriment, as it is where subjected to adverse criticism and unfair assumptions in making comparisons between the maximum and minimum schedules of the supplying companies.

MR. KENNEDY: I may say that my experience runs along lines parallel with those Mr. Freeman has indicated. In fact in my own company which operates in a number of districts, the district that pays us the best return per kilowatt on the investment in generating capacity is the one in which the average rate is lowest. I asked my question because at a hearing before the Railroad Commission in this State not long ago a contract came before the Commission for approval. It was submitted by a company whose business had been investigated by the Commission, which had fixed the cost of energy delivered at the generating station or substation. It was a case where the energy was to be supplied to a certain manufacturer and the Commission was asked by the company to approve the contract at a rate per kw-hr which was about 10 per cent less than the average cost of energy as fixed by the Commission. The question asked by one Commissioner was how the company could justify the sale of energy at 10 per cent less to this particular consumer than the average cost as found by the Commission to be the cost of generation or delivery at a particular substation.

My own experience has been that a company can sell energy at less than its average cost and make a good profit. I asked the question because of a doubt in the minds of some who are supposedly qualified to know, as to the ability of a company to carry on business under such conditions.

MR. JOHN F. GILCHRIST, Chicago: I had the pleasure, not very long ago, of attending a dinner tendered to President Judson of the Chicago University. His topic was the Chinese nation. President Judson a year or two ago was appointed by the President of the United States to head a commission to study certain Chinese conditions, and in order to do that he spent about six months in China. At the head of the table at this dinner was Mr. W. J. Calhoun, recently our minister in China, who had lived there for three or four years. In his speech, President Judson said, "The man who has spent two weeks in China is qualified to write a book on the Chinese nation. The man who has spent a month there can prepare a magazine article covering a dozen pages. The man who has spent six months there is qualified to make an after-dinner speech," referring to himself, and "A man who has lived in China for four years is qualified to sit at the head table and say nothing." It seems to me such a statement might be made of this general rate situation. I have been discussing the question of rates for just about 30 years, and probably some of you men older in the business have been discussing it a little longer than that, and I think those who have studied it longest feel that it is a very difficult question. The subject is so big, so many conditions affect rates, so many new factors are coming into our industry every year which have a bearing on rates, and in addition to these, the extension of our business, the improved machinery, improved distribution systems and all of those things, bear very importantly on rates.

The things that attract the new men in the industry are the superficial things, and naturally the things which appeal to the general public and to our utility commissions are the superficial things. I do not think we are very far apart on the fundamentals. We all recognize the factors which enter into the formation of rates, and the analyses shown by the plotting of rates in curves indicate that we are pretty close together, but in lesser matters, the things that appeal to the utility commissions and the general public, we are not on common ground. This seems to me unfortunate, and the matter has been impressed upon me more and more in recent years as I see the commissions taking up and going into rates.

I was recently before the Illinois Commission on the question of rates in small towns. The commissioners took a very superficial view of the situation, and their minds seemed to run somewhat along these lines: "We can look over this country from one end to the other and we find almost as many different schedules of rates as there are different lighting companies. Now, you gentlemen who have studied this matter for 10, 20 or 30 years, do not seem to be able to agree on the subject. In other words, one man's judgment is about as good as another's. That being the case, our inclination is to brush aside all of these rates and establish a set of rates of our own, because we think that our judgment is just as good as your judgment."

This is a matter that causes us a great deal of concern. If

15 years ago a dozen of the big companies in this country had got together and adopted, so far as retail rates are concerned, a general plan, and also adopted some uniform plan for their wholesale rates, that plan would be universally followed to-day, and we could go across the country from one end to the other and find ample precedent for the support of our rates before a commission. We would find an outward appearance of uniformity in the rates which would be of very great assistance to us before the commissions, which would make it unnecessary to go quite to the bottom of the rate scheme and educate men over periods of three and four years before they fully realise that there is a very great similarity between our rates.

I think one difficulty in considering rate schemes is the difficulty we had when we first began to talk about advertising. We were more or less fascinated with the game. Each man going into it thought himself a born advertiser, and wanted to develop and put into effect his own little peculiar ideas and whims. The chances are that after he has been in the business for a very long time he will appreciate the fact that the men in the business who are the recognized authorities on advertising were really right all the time, and that he was wrong.

It seems to me that before putting rates into effect we should take a very unbiased and impersonal view of the subject and make a thorough study of it, putting our own whims and ideas in the background. It is a very serious thing to make a change of rates in any big company, or in any company, for that matter, because in all the relation of the income loss which may be due to a change in rates compared with the general net results to the company, is probably relatively the same. If any of you doubt that, you have only to work out some theory of rate modification which involves apparently a very little change, and then try it on your own customers to find out how great a loss or how great a gain results in its application to your business. Why, it is no wonder that there is great reluctance on the part of utilities, no matter how much they may talk of the theory of rates, to change their rates. It would take the Commonwealth Company a long time to make up its mind that it wanted to adopt the New York schedule of rates, and a long time to determine the effect of the application of those rates to its business, and to ascertain whether there would be a loss or a gain in income, and also what the driving away of business might be.

The same thing would apply to Mr. Williams in any consideration of the adoption of the Chicago rates. The same thing would probably apply to each of us in the consideration of any plan to adopt a compromise rate upon which we might both agree as being a logical rate.

I should very much dislike to see the work of the Rate Research Committee given up. I believe that more attention, rather than less, should be paid to that work. We are using the publications of the Rate Research Committee, and I know that the utility commissions of the country and their employees are reading these and getting ideas from them just as members of our own industry are. I have lately in two cases had the theories of rates advanced by our Rate Research Committee thrown up to me in a rate discussion before a commission, so that I think we should be very careful to know what goes into our Rate Research Committee publications, and be very careful to read what is in our Rate Research publications and be fully informed.

Mr. Almert: As an indication of how at least one commission viewed the situation, in an informal discussion with one of the Wisconsin commissioners, about a year ago, in a matter where request had been made for a reduction in rates in a small town of less than 5000 inhabitants, he said he found that the circumstances and situation were such that there was no opportunity for a reduction of the rates. The only opportunity by which a reduction of rates could be had was for the company to supply power to a lone industrial firm there at the rate of 1 cent per kw-hr. The commissioner analyzed the situation and recommended that the utility and the large consumer try to get together.

He stated that if this consumer were taken on, his demand would furnish a basis for an all-day load and would give the operating company a profit during the daylight hours which would create an adequate return on the investment, and possibly afford a basis for the reduction of the rates later.

Chairman Wagner: I hope you will permit the Chairman to say a few words in answer to Mr. Kennedy. Some of the points have been sufficiently emphasized. One recommendation of the Research Committee is that no rate shall be below the cost, the bare cost, of service. Now the cost of service is not generally proportional to the kilowatt-hours used. If that is so, then the cost of service on the kilowatt-hour unit must vary considerably between different classes, and if the cost varies considerably—which can be proved readily—then the average cost is not the measure for any individual cost. A fair use of the term "average cost" presupposes costs of service below and above that average; and if there are costs of service above that average, there must likewise be costs of service below that average. It is justifiable upon the basis of the cost of service therefore, to serve some consumer, some classes of service, which cost less than the average, at a price less than the average. I think those matters can be so readily shown that the question is comparatively easy to answer on that basis.

Is there to be any further discussion on this report? If not, I will ask Mr. Lloyd to close the discussion.

Mr. Lloyd: I hardly think there is anything further to say regarding this important part of our business, but the thought has occurred to me that our rate situation, in addition to the reasons advanced this morning, is very considerably affected by the evolution of our business. That is, we progress generally, and we find uses for our energy in ways we little imagined even ten years ago. This evolution is directly connected with the increase in load-factor in general. We can all remember that when the load-factor of a central station reached 30 per cent we thought we were doing pretty well. We find now that here in San Francisco it is 60 per cent or even better.

The Rate Research Committee has devoted several years to this question, and I am pleased to note a very considerable change in the opinion of many member companies with regard to its work. It started out under great difficulties, because, at that time, there were few commissions in the states. Since then, I think something like 44 or more have been appointed. The Committee's work has gone through an evolution also, and while at the moment it does not appear necessary to continue the work, if the general convention thinks it should be continued I have no doubt the incoming administration will be glad to retain this committee, or appoint a new one.

Chairman Wagner: The motion before the session is the acceptance of the report, and a recommendation to the Executive Committee that both the Rate Research Committee and the publications of the Rate Research Committee be continued for another year.

Mr. Arthur Williams: If it be proper I would like to include in the motion before the session a vote of thanks for the work that has been done by this Committee.

(The following original motion of Mr. Harold Almert (see page 348), including his acceptance of the modification suggested by Mr. Arthur Williams, was duly recorded and put:

Resolved: It is recommended that the work of the committee on Rate Research be continued for another year, as well as the publication of the *Rate Research Bulletin;* and that the report of the Committee be accepted.)

Chairman Wagner: You have heard the motion. Is there a second. (Seconded) All in favor will please say Aye.

(Motion carried)

Chairman Wagner: The next number is the report of the Power Sales Bureau of the Commercial Section, Mr. C. J. Russell, Chairman. He is unable to be present and Mr. C. H. Stevens, the secretary of the Committee, will take his place in the reading of the report. I might add that the next three papers were prepared under the auspices of the Power Sales Bureau and will be considered together. All three will be read, and we will then discuss them together.

REPORT OF THE POWER SALES BUREAU

The work of the Power Sales Bureau since its organization at the Philadelphia Convention has consisted particularly of preliminary constructive efforts along the following lines:

The formulation of a comprehensive plan for the subdivision of Power Sales Bureau work;

Obtaining the names, addresses and special qualifications of men actively engaged in power sales work;

Seeking methods of co-operation between the Power Sales Bureau and other committees of this and other Associations engaged in similar work;

The standardization of the collection of statistics and data by the members of the Power Sales Bureau;

The establishment of a clearing house for the collection and dissemination of data and information relating to the Power Sales business.

ORGANIZATION

The following subdivision of the work of the Power Sales Bureau has been adopted:

COMMITTEE 1 Power Sales Bureaus, Organization and Methods.

Sub-Committees A Constitution of Bureau
B Qualifications of Men.

COMMITTEE 2 The Education of Power Salesmen.

COMMITTEE 3 Statistics and Data.

This Committee will constitute a clearing house for the collection of data and information from all the subdivisions, and material so collected will be filed at the headquarters of the Commercial Section in New York. It is expected that all inquiries for information relating to power work will be referred to this Committee for attention and reply.

Sub-Committees A The standardization of the collection of statistics and data by the members of the Power Sales Bureau
B The standardization of forms upon which such information shall be collected and preserved

C Recommendation as to the definition of load-factors and demand measurements to be used in the collection of such standard data.

COMMITTEE 4 Industrial power applications under the following subdivisions:

Sub-Committees

- A General Information
- B Mining, Quarrying, Mineral and Stone Products
- C Metal Working
- D Wood Working
- E Textile, Clothing, Fibres, etc.
- F Food Products
- G Leather Workers, Tanneries, etc.
- H Glass Manufacturing
- I Ventilating, Heating, Water Supply, Sanitation, etc.
- J Ice Making and Refrigeration
- K Laundries, Dry Cleaning, etc.
- L Hoisting, Elevating, Conveying, etc.
- M Public Institutions, Amusements, etc.
- N Office Buildings, Hospitals, etc.
- O Printing, Publishing, Bookbinding, etc.
- P Department Stores
- Q Chemical Products
- R Paper and Pulp Manufacture
- S Electricity on the Farm.

COMMITTEE 5 The Supply of Power for Operating Electric Railroads and Railways.

COMMITTEE 6 Sub-surface and Municipal Construction.

COMMITTEE 7 Electric Vehicles.

COMMITTEE 8 Special Motor Applications.

COMMITTEE 9 Electric Heating Applications other than Furnaces and Welding.

COMMITTEE 10 Electric Furnaces and Welding.

COMMITTEE 11 Electro-chemical Supply.

COMMITTEE 12 Electro-therapeutic Supply.

COMMITTEE 13 Steam Heating.
COMMITTEE 14 Competitive Power Sources.
  Sub-Committees A Isolated Steam Plants
    B Gas, Oil and Producer Plants
    C Power Purchased with Space
    D Power Costs
    E Disposal of Displaced Apparatus.
COMMITTEE 15 Relation of Lighting to Power Sales.
COMMITTEE 16 Increase of Load Factor.
  Special reference to obtaining high load-factor and off-peak business.
COMMITTEE 17 Typical Power Sales Development in the West.

PERSONNEL

The work of obtaining information relating to the names, addresses and special qualifications of men actively engaged in power sales work has been difficult on account of the lack of such information in available form so far as the Commercial Section membership is concerned.

On March 15, 1915, the names of 350 men had been obtained and with these correspondence had been held relating to the general plan of the Power Sales Bureau to which they gave their approval. Present indications are that a list of 1000 names will be secured and that the special qualifications of all will be determined.

This important preliminary work has involved a great mass of correspondence and has taken a great deal of time.

RELATIONS WITH OTHER ORGANIZATIONS

In seeking methods of co-operation between the Power Sales Bureau and other committees of this and other Associations engaged in similar work the particular object was naturally the prevention of a duplication of work by the various bodies interested in power sales.

At the very beginning the Power Sales Bureau was offered the complete co-operation of the Society for Electrical Development. As the work progresses it is believed that this co-operation will be of tremendous benefit in carrying on the work of this organization and that it will be of real advantage to the Society for Electrical Development in many ways. The Society is represented in the Power Sales Bureau through the membership of Mr. Mallett who has taken an active part and a great interest in all of our work.

Committee No. 2, which is charged with the subject "The Education of Power Salesmen," will co-operate with the Committee of the Commercial Section on "Education of Salesmen," and assist in preparing suitable educational matter for the power men of our companies, to be issued as a part of the course of instruction. The Power Sales Bureau will see to it that there is no duplication of effort.

The Electric Power Club and its predecessor, The American Association of Electric Motor Manufacturers, has accomplished through systematic effort an important work which through their co-operation becomes available for the general information of the members of the Power Sales Bureau as part of the work of Sub-Committee A of Committee No. 4. We hope to have the further co-operation of the Electric Power Club as their work of standardizing practice advances.

The Industrial Power Committee of the American Institute of Electrical Engineers has been engaged for some time in the development of a complete treatise covering the engineering fundamentals of motor application work, through papers treating of the engineering features of motors, industrial control apparatus, methods of drive and conditions of application, leading up to details relating to the various fields of electric power applications. The Power Sales Bureau can work with the American Institute of Electrical Engineers in this, and it seems very desirable that such co-operation should be arranged for upon some basis of mutual advantage to eliminate duplication of effort along certain lines. Your Chairman is in correspondence with the A. I. E. E. on this subject.

STANDARDIZING STATISTICS AND DATA

The work of creating standards for the collection of statistics and data by the members of the Power Sales Bureau has been undertaken along the following lines:

The adoption of a definition of load-factors and demand measurements decided upon by the American Institute of Electrical Engineers and enlarged upon in the report of Mr. J. W.

Lieb of the Association of Edison Illuminating Companies, September, 1914.

The standardization of forms upon which such information and data relating to motor applications shall be collected and preserved.

The preparation of standard monographs relating to specific industries showing the flow of materials in such industries, giving the names of the steps in the process of manufacture, the names of the machines used in such steps, and indicating details which result in variations in the amount of power per unit of manufacture.

INTERCHANGE OF POWER INFORMATION

The establishment of a clearing house for the collection and dissemination of data and information relating to the power sales business evidently represents the most important object of the entire organization. It has been decided that all material collected through the efforts of all the committees and sub-committees should be deposited at the headquarters of the Commercial Section in New York. All inquiries relating to power sales are naturally sent either to the *Question Box* or to the Secretary of the Association. These inquiries are often of an urgent character and require immediate attention if the information is to be of any value to those who ask for it. Through the accumulation of information and data it is believed that many of these inquiries can be answered at once and that those requiring more detailed treatment should be forwarded to the Chairman of the committee in charge of the subject upon which information is requested. A record of such inquiries with copies of the replies should be kept on file at headquarters as part of the clearing house work.

CONVENTION PROGRAM

The program of work at this Convention has been prepared by the Committee to cover the work of the Power Sales Bureau during its first year of existence.

As part of the activities of the Power Sales Bureau it has been deemed best to arrange for a dinner at each convention with the object of promoting a better acquaintance among the power men of the Commercial Section and permitting a general discussion on power subjects.

RECOMMENDATIONS

The Power Sales Bureau recommends:

That the work outlined in this report shall be given wide publicity on account of its importance to the central station industry and to the membership of the Commercial Section;

That the members of the Commercial Section use their best efforts along the lines of co-operation mentioned;

That the usefulness of the Power Sales Bureau be extended through representatives in the State and Geographic sections of the National Electric Light Association;

That an appropriation be made to cover the expenses of clearing house work at headquarters during the coming year;

That the material collected through the work of the Power Sales Bureau be made available for publication in the Power Section of the *Electrical Salesman's Handbook.*

Respectfully submitted,

C J Russell, *Chairman*
G H Jones, *Vice-Chairman*
C H Stevens, *Secretary*
C W Bartlett
R P Burrows
F A Coffin
E L Crosby
J M Curtin
S R Dresser
H C Gille
H G Glass
C A Greenidge
H H Holding
J J Hurley
R H Knowlton
I Lundgaard
J P Mallett
John Meyer
C K Nichols
J C Parker
R H Tillman
G B Tripp
S V Walton

DISCUSSION

MR. CHARLES J. RUSSELL (written): This branch of the Commercial Section has in the first year of its existence formulated a comprehensive plan for handling information and data relating to power sales, the work being divided among 17 main and 29 sub-committees. Three hundred and fifty members of the Commercial Section have signified their desire to be associated in the work and designated branches in which they are interested. Important steps have been taken towards co-operation with other organizations interested in similar work, notably with the American Institute of Electrical Engineers, the Society for Electric Development, the Electric Power Club, and other committees of the National Electric Light Association. The standardization of the collection of statistics and information relating to Power Sales has progressed to the point of adopting definitions of factors and of a data form. Monographs showing flow of materials in various industries are being prepared. The establishment of a clearing house at headquarters of the Association for the collection and dissemination of information has been undertaken. The plans for future work contemplate contributions to convention programs through reports on timely topics along the lines of the five papers presented before the Commercial Section at this convention. Recommendations include development of the work through the various Sections and co-operation with other organizations and committees.

MR. ROBERT H. KNOWLTON, Philadelphia: In behalf of Branch B Sub-Committee 3, which had this work in charge, I am pleased to submit this yellow form which has been distributed here today. You will note that it is 10½ by 7 in. in size, and when folded twice, is 7 by 4 in., which are the exact measurements of the sheet which has been standardized for insert in the *Salesman's Handbook.*

It is proposed to utilize one side of the sheet for power data, which in our judgment includes maximum demand, monthly consumption, power-factor and all such information as will aid in determining the exact character of the load.

The opposite side is to be used for listing what may be termed manufacturing data, such as a description of the finished product and uses, raw materials, routing through the factory and all such information as will aid in giving an intelligent understanding of the business.

POWER DATA

INDEX NO.
FILE NO.

1 BUSINESS__________

2 NAME __________

3 ADDRESS __________ STREET __________ CITY __________ STATE

4 SEASONS OF OPERATION__________ SPRING __________ SUMMER __________ FALL __________ WINTER

5 INSERT HOURS OPERATED PER DAY____

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.

	OPERATED FROM	
	CENTRAL STA.	PRIVATE PLANT
6 LOAD FACTOR %______		
7 TOTAL CONNECTED LOAD IN K. W.		
8 MOTORS CONNECTED LOAD IN H. P.		
9 LIGHTING CONNECTED LOAD IN K. W.		
10 OTHER ELECTRICAL APPARATUS IN K. W.		
11 TOTAL NUMBER OF MOTORS		

12 SPECIAL APPLICATIONS	MACHINES DRIVEN
A REQUIRING TWO OR THREE SPEED (AC) MOTORS	
B REQUIRING VARIABLE SPEED (AC) MOTORS	
C REQUIRING HIGH STARTING TORQUE	
D THAT WILL PERMIT OF SYNCHRONOUS MOTORS	
E REQUIRING D. C.	

13 TYPE OF DRIVE__________ GROUP __________ INDIV. __________ MIXED

14 OPERATING DATA ON CENTRAL STATION SERVICE

19	K. W. MAX. DEM.	K. W. HRS.	K. W. MAX. DEM. BET. 5 P.M.-9 P.M.
JAN.			
FEB.			
MAR.			
APR.			
MAY			
JUNE			
JULY			
AUG.			
SEPT.			
OCT.			
NOV.			
DEC.			
TOTAL			

15 STATE % OF NORMAL PRODUCTION DURING YEAR REPRESENTED BY ABOVE DATA______%

16 POWER FACTOR UNDER AVERAGE OPERATING CONDITION______

17 TOTAL H.P. AND % OF K.W.H. CONSUMED INDIRECT USAGES___H.P.___%

18 SERVICE D.C.______VOLTS
A.C.______PHASE______CYCLES______VOLTS

19 CONTRACT FORM OF RATE SCHEDULE______
CONTRACT PERIOD______

20 REMARKS:—

KEY
(6) Load Factor in Terms Selected by Section C Sub-Committee 3
(10) Such as Heating Apparatus, Furnaces, Welding Machines, Electrolytic Baths
(12a) State Machines Requiring 2 or More Speeds with Constant Speed Characteristics
(12b) State Machines Requiring Variable Speed Secured by Rheostatic Control
(17) By Indirect Usage is meant Plant Water Supply Pumping, Ventilation and Other Power Requirements Not Peculiar to the Industry
(19) State your Rate Schedule Designation

MANUFACTURING DATA

1 DESCRIPTION OF FINISHED PRODUCT AND USES

2 RAW MATERIALS

A STATE SOURCE

B DESCRIBE

C HOW TRANSPORTED

D DESCRIBE ROUTING THROUGH THE FACTORY

3 WORKS BUILDING REQUIREMENTS

A NUMBER OF BUILDINGS

B TYPE OF CONSTRUCTION

C TOTAL FLOOR AREA

D TOTAL VOLUME

E EXPOSED AREA (1) TOTAL WALLS % GLASS

(2) ROOF

F SQUARE FEET OF RADIATING SURFACE

4 DESCRIPTION OF PROCESSES

5 STEAM REQUIREMENTS

A FOR BUILDING HEATING

B FOR MANUFACTURING PROCESSES

6 NUMBER OF EMPLOYEES

A WORKS

B OFFICE

7 REMARKS

KEY

(3) THIS DOES NOT INCLUDE OFFICE OR ADMINISTRATION BUILDINGS

(4) DESCRIBE PROCESSES, GIVING TOOLS USED (NAME, SIZE AND MAKER)

(5) DESCRIBE IN DETAIL, GIVING APPROXIMATE AMOUNT FOR EACH PROCESS

(7) STATE PECULIAR ADVANTAGES OF CENTRAL STATION SERVICE IN THIS CASE

In considering what information should be listed on this sheet, a great effort has been made to eliminate all that could possibly be omitted. If a member company is considering the securing of the business of an industry that no one in the organization has had any experience with, it will need to know before attacking the problem just how valuable or how profitable this business, if secured, would be to the company. That being the case, the hours of operation of the plant per day, the working days per week and per month, whether the business is a seasonal one, must be ascertained, together with that proportion of the prospect's maximum demand which will occur at the time of the maximum annual station load.

In addition to this, the power salesman, in approaching a prospect, ought to have a working knowledge of the processes and the machinery requirements of the particular industry, so that he can talk intelligently and be able to advise as to the class of motor drive to be installed.

It has been the aim of your Committee to require the listing on this sheet of all the information deemed necessary, as described, and it is hoped that our efforts have been successful. If the form as submitted is accepted, it is recommended that the member companies be supplied with a stock of these, so that after a consumer has been secured and has purchased power for one year, the information obtained can be listed on one of these sheets and forwarded to headquarters in New York. Subsequently copies of this can be mimeographed and either sent out to the several member companies or to those who may apply for information concerning the industry in question.

If this plan is followed, it is our opinion that a very much higher degree of co-operation among power sales workers will be secured than has been experienced heretofore.

MR. J. G. LEARNED, Chicago: I would like to ask if these are for the files of the company or for the salesmen. If they are for the salesmen's use, then it will be necessary to have them typewritten or re-written for the files of the company. If they are not re-written, what record would the company have of the work done by its salesmen?

MR. KNOWLTON: It is hoped that the several member companies will adopt this sheet as standard for such information as they require for their files. It is expected that a carbon copy will be made of the sheet sent to headquarters, which carbon copy can be used for the company file.

MR. LEARNED: I would like to get some information from the other companies as to their standard size of forms. In our company we use 8½ in by 11 in letter paper. We use a form somewhat similar to this containing these printed portions, and that we keep as a permanent record. In the event that a salesman is transferred, has a promotion or leaves the company, we then have a complete record of all the work that has been done by him. In that way we do not have to go back to a customer and bother him by going over the same work. When we put a new salesman in the same field he can take up the work of the old salesman just where the old salesman left off. By following this procedure we not only save ourselves a lot of money and time, but we also protect the customer, which is a very important thing. We do not duplicate our work.

I am inclined to think that such a form is all right for the salesman, but for a permanent record we should get something that will fit in with our standard forms. I believe that the standard form we have been approaching is letter size paper cut down from legal cap size. Some of the reports here are on letter paper size. I think we should give this careful consideration before we adopt it as a standard form.

MR. KNOWLTON: This form is submitted for your criticism or approval. We hope that it contains all the information that will be deemed necessary. It will perhaps be impossible to select a size that will meet with the approval of all the member companies, and it has been deemed wise to select one that at least conforms with the *Salesman's Handbook.*

MR. DOUGLASS BURNETT, Baltimore: The Baltimore Company has recently adopted a schedule of industrial gas rates. It has been shown very clearly that a great deal can be accomplished both on the gas end and on the electrical end of the business by seeking to develop the use of industrial gas just as we have actually developed the use of industrial electric power. One of the great difficulties in getting power business has been to overcome the obstacle of steam for manufacturing purposes. The Baltimore Company feels that there are a great many ways in which industrial gas can be used as a substitute for steam, thereby not only creating a market for a large amount of gas, but opening the way to sales of a very large amount of power.

In the case of the Baltimore company we have been running at from 28 to 30 per cent load-factor, and not until last year was there any substantial change in the load-factor. I am speaking now of gas. From about 1898 until 1913 the load-factor on the gas system varied about one to three per cent from year to year. Last year it showed an upward tendency. Now, during this period the electric system has been increased from 26 to 52 per cent.

The Baltimore Company is proud of what it has done in this connection, and we propose to improve our gas load-factor in the same way that we have improved our electric load-factor. The reason I dwell upon this is that I am looking for close co-operation between the National Commercial Gas Association and the Commercial Section of our Association. I took occasion to talk to Mr. McLane at length upon this subject recently. He said that no one in the gas industry had taken the pains to collate such data as these that have been collated by our Sales Bureau. Personally, I have been able to find not more than three such individuals. It is not necessary for me to state who they are. There is big work to be done along this line.

I believe this will be a very useful form. It is just the right size, and convenient to go into the *Salesman's Handbook,* and I am going to make arrangements for the National Commercial Gas Association to adopt the same form for industrial gas. My reason for believing that the Gas Association will be glad to do this is based upon the conversation I had with Mr. McLane, the president of the Gas Association, and if we can get them to adopt the form, the information that will be summarized on it can be used by us. We shall be able to make our power sales intelligently.

I would like to say one word more on this subject. Through the activity of the representatives of the Commercial Section of our Association, the Gas Association last summer adopted the specifications of our Commercial Section *Handbook.* The Gas Association has no statistics with regard to the gas industry, and the accumulation of these will be another step in the right direction. If you can have any better example of desirable co-operation, or a more splendid opportunity for successful business cooperation, I cannot imagine it.

MR. J. H. McDOUGAL, San Francisco: Under Subdivision

C, "Recommendation as to the definition of load-factors and demand measurements to be used in the collection of such standard data," I have the following to report:

The **load factor** of a machine, plant or system is the ratio of the average power to the maximum power during a certain period of time. The average power is taken over a certain period of time, such as a day, a month or a year, and the maximum is taken over a short interval of the maximum load within that period.

In each case the interval of maximum load and the period over which the average is taken should be definitely specified, such as a half-hour monthly load-factor. The proper interval and period are usually dependent upon local conditions and upon the purpose for which the load-factor is to be used.

The following supplementary definitions are offered:

Plant factor is the ratio of the average load to the rated capacity of the power plant.

The **demand** of an installation or system is the load which it puts on the source of supply, as measured at the receiving terminals. The demand may be as specified, contracted for, or used. It may be expressed in kilowatts, kilovolt-amperes, amperes, or other suitable units.

The **maximum demand** of an installation or system is its greatest demand, as measured, not instantaneously, but over a suitable and specified interval, such as a five-minute maximum demand.

Demand factor is the ratio of the maximum demand of any system or part of a system to the local connected load of the system, or of the part of system under consideration.

Diversity factor is the ratio of the sum of the maximum power demands of the subdivisions of any system or part of system to the maximum demand of the whole system, or of the part of the system under consideration, measured at the point of supply.

Connected load is the combined continuous rating of all the receiving apparatus on consumer's premises connected to the system or part of system under consideration.

MR. R. B. MATEER, Riverside, Cal.: An analysis of the subdivision under which power installations are classified shows division S, Electricity on the Farm.

This, I believe, is intended to include all kinds of power in use for agricultural purposes, whether it be for irrigation, reclamation, or for what might be termed ranch purposes, to-wit: The grinding of feed or the operation of an electric plow. These and more subdivisions of division S might be made, but I believe it would be advantageous to limit this division to such industrial applications of power as may occur on the farm, and which in no manner infringe upon that broad field now developed to such a great extent in California and known as, "Irrigation and Reclamation of Lands." I, therefore, suggest that division T be known as Irrigation and U as, Reclamation. Both of these subjects were passed over with but little attention in all the papers dealing with power development, and in view of the amount of data at present available, some effort should be made to have this prepared for the coming meeting.

MR. M. O. DELLPLAIN, Syracuse: A point that should be brought out at this time in connection with the adoption of any standard terminology is the necessity for uniformity in practice. I had occasion not long ago to use some of the standard abbreviations adopted by the A. I. E. E. and I was surprised when I came to the abbreviation for kilowatt hour. I find that I object to the r. It seems strange that practice is not given more consideration in adopting these symbols. It really wastes time to write kw-hr in the way the Institute has abbreviated it. I would suggest the use of KWH instead. It is the natural way of writing it, although theoretically it may be subject to criticism.

CHAIRMAN STEVENS: We will now have the paper entitled "The Commercial Application of Resistance Furnaces," prepared by Mr. C. W. Bartlett of Schenectady.

THE COMMERCIAL APPLICATION OF ELECTRIC RESISTANCE FURNACES

Electric resistance furnaces designed to meet the needs of industrial heating at low, moderate and relatively high temperatures can be used for so many purposes that they offer great possibilities as new load builders. It is not intended in this paper to give a complete list of applications but the following classified list will serve to indicate to central station men the extent of the increase in current demand which a widespread adoption of this type of furnace would secure.

CLASS No. 1—Applications requiring temperatures from 1000 degrees C to 1400 degrees C
- (a) Hardening high-speed steel
- (b) Heating steel bars for forging, welding and upsetting
- (c) Melting copper, gold, etc.
- (d) Heating bolt and rivet stock

CLASS No. 2—Applications requiring temperatures from 450 degrees C to 1000 degrees C
- (a) Annealing copper, brass, carbon steel, high-speed steel and malleable iron
- (b) Hardening carbon steel and certain classes of high-speed steel
- (c) Heating copper, brass and Monel forging bars
- (d) Melting zinc, silver, aluminum, etc.
- (e) Case hardening and drawing baths

CLASS No. 3—Applications requiring temperatures from 250 degrees C to 450 degrees C
- (a) Sherardizing
- (b) Melting tin, lead and babbitt
- (c) Annealing carbon steel
- (d) Heating oil tempering or drawing baths and for boiling varnishes, etc.

CLASS No. 4—Applications requiring temperatures from 100 degrees C to 250 degrees C
- (a) Baking japan, enamels and lacquers
- (b) Baking insulating compounds, drying out impregnated woods and vulcanizing
- (c) Heating moulds

ELECTRIC RESISTANCE FURNACES FOR CLASSES NO. 1 AND NO. 2

Applications

The electric furnaces described in this paper for Classes No. 1 and 2 are of the carbon resistance type. A complete equipment includes the furnace proper, built of firebrick with iron framework, a control panel and the regulating transformer or compensator with proper voltage taps for maintaining a constant temperature in the furnace.

The furnace in outward appearance is similar to an oil or gas-fired furnace utilized for the same purpose. Its lining and floor are built of special brick, having very high refractory qualities, which will withstand indefinitely the temperature of the heating chamber.

The heating chamber is equipped with a main and an auxiliary resistor. The main resistor is carried upon the refractory floor and consists of foundry coke several inches in depth, which has been crushed to one-half or three-quarter inch mesh. The auxiliary resistor consists of an arch roof built of a special refractory material which becomes a conductor as soon as it has been heated by the coke resistor. Current is carried from the line to both resistors through the medium of carbon electrodes placed at either side of the heating chamber, entering at the top and passing downward through a side pocket filled with pulverized carbon, past the conducting arch; its lower end making contact with the coke resistor.

This method of construction allows current to be fed through the main resistor to the refractory conducting arch in the roof also, by means of the low resistance pulverized carbon, without establishing an arc or high resistance junction. The powdered carbon further serves to prevent oxidation so that the life of the carbon electrodes is prolonged indefinitely. The carbon powder also acts as an efficient heat insulation, lying as it does adjacent to the heating chamber on either side. The carbon electrode and fine powdered carbon surrounding it, offer very little resistance to the passage of the current and practically all the heat is generated in the coke resistor and in the roof of the furnace, resulting in high heating efficiency. This direct action combined with a very large radiating surface requires the resistor to be only slightly hotter than the temperature of the heating chamber; a condition which insures long life for the refractory lining.

With the furnace doors closed, the carbon resistor when heated to operating temperature, eliminates the oxygen from the furnace atmosphere by combining with the oxygen to form CO or CO_2. Thus by controlling the ventilation of this chamber, either a reducing, neutral or oxidizing furnace atmosphere may be obtained. The value of a neutral or reducing temperature in the heating of many metals, such as steel, aluminum, brass, etc., is clearly recognized by all who have to do with such work. Dies and tools may be tempered and hardened without scaling or oxidation; steels may be annealed with no perceptible loss due to scale.

The temperature control of a resistance furnace of the carbon resistor type, is designed to take advantage of the negative temperature co-efficient of the main and auxiliary resistors; that is, as their temperature increases, their electrical resistance becomes less. In other words, the furnace draws more current from a constant voltage source when hot than when cold. For example, a 110-volt furnace may draw 100 amperes from the line at 800 degrees C and 125 amperes at the same voltage when heated to 1000 degrees C. The aim of the control is automatically to obtain and hold approximately constant the temperature in the working chamber of the furnace. The control panel is arranged to throw the furnace upon either of two voltages, one usually about half the value of the other, depending upon whether the resistor temperature is above or below the temperature desired in the working chamber.

When the higher voltage is connected to the furnace it absorbs power more rapidly, and consequently, generates heat faster than it can be absorbed by the charge in the furnace and the furnace walls; consequently, the flow of current through the resistor increases until it reaches a predetermined value when the half voltage circuit is automatically connected to the furnace. The furnace then absorbs less power and generates heat at a lesser rate than it is absorbed by the furnace charge and its own walls, therefore the current flowing through the resistor again decreases until it reaches a predetermined minimum value, when the furnace is again connected to the higher voltage circuit. This cycle operating in connection with the high heat storage capacity of the furnaces gives practically a constant operating temperature.

The minimum and maximum limits of the current flowing in the resistor can be varied at will by adjusting the relays, rheostat and switches on the control panel. When operating the furnace at high temperatures the resistor has a low resistance, and at low temperatures it has a high resistance. For example, a furnace which requires 110 volts to secure a temperature of 900 degrees C may require only 60 volts for operation at 1200 degrees C. In order to provide for this requirement, the control panels and transformers are arranged so that any one of four voltages may be employed, covering the whole range in operating temperatures. In other words, the control allows of such adjustment that a given furnace may be operated at any temperature from 500 degrees to 1400 degrees C.

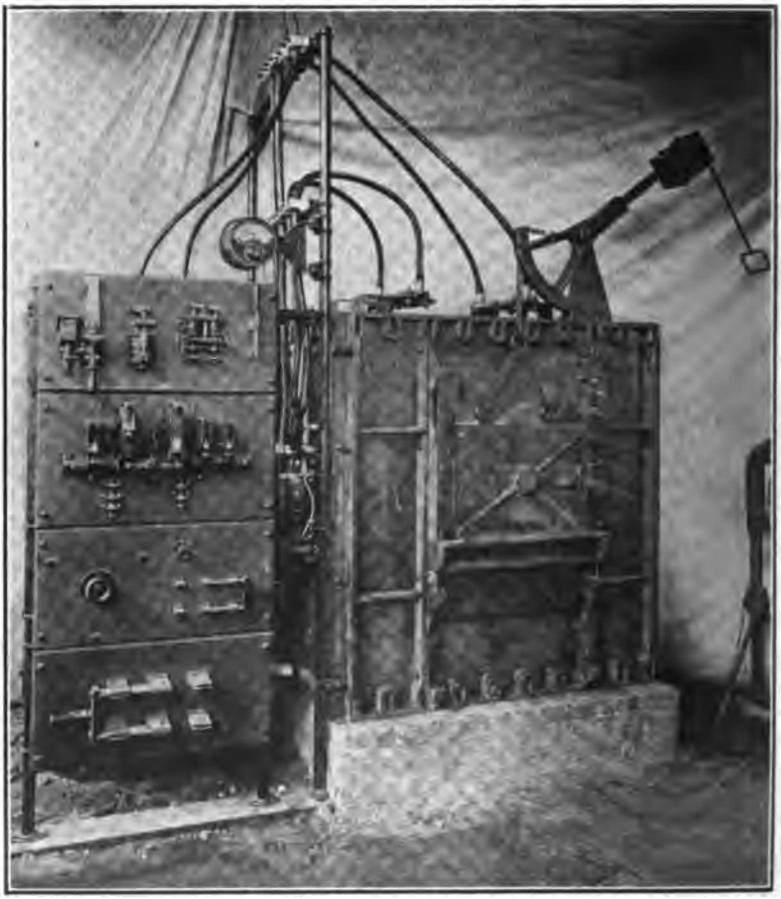


Fig 1—Type RFF-4-24/22-60 Forging Furnace

Fig 1 illustrates the general appearance of resistance forging furnaces which can be furnished for operating at temperatures not exceeding 1400 degrees C.

(RFF-4-24/22-60) (RFF-4-24/26-75) (RFF-8-18/12-40)

The following resistance hardening or annealing furnaces (Fig 2) can be supplied for operating at temperatures from 500 to 1000 degrees C.

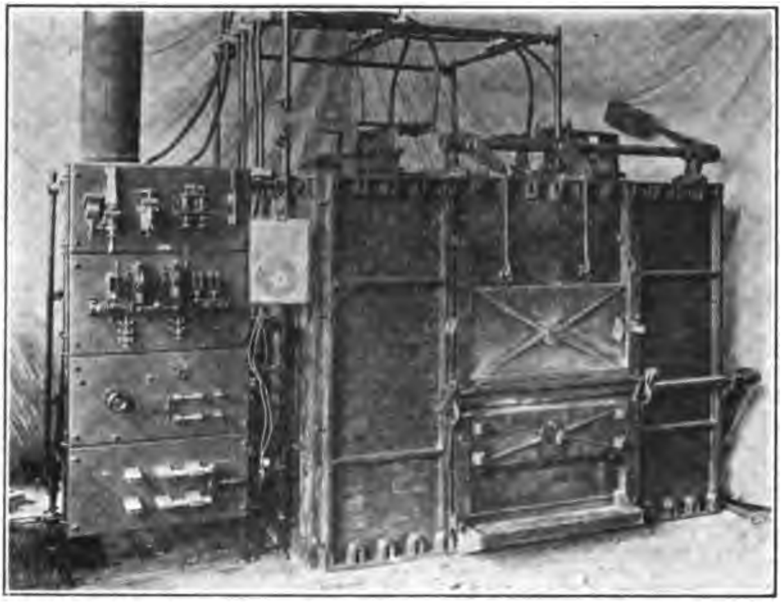


Fig 2—Type RFF-12-30/36-75 Annealing and Hardening Furnace

(RFH- 6-18/12-30)
(RFH- 6-24/18-40)
(RFH-12-36/30-75)
(RFH-12-48/36-150)
(RFA-12-72/24-100)
(RFA-24-96/60-200)

The nomenclature of the first furnace shown should be interpreted as follows:

Resistance forging furnace, door 4 in high, depth of heating chamber 24 in, width of door and heating chamber 22 in, kilowatt capacity of transformer 60. That is, this furnace will convert a maximum of 60 kilowatts of electrical energy into heat in case sufficient material is introduced into the chamber to absorb it.

As a definite illustration of the furnace atmosphere in the heating chamber, the following analysis was made of the gas in the heating chamber of a furnace rated — RFH-12-36/30-75, operating at 800 degrees C.

CO^2	13. %
O	.0
CO	.8
N	86.2

By injecting a small amount of steam into the furnace, an analysis showed the atmosphere to be as follows:

CO^2	5.5%
O	.2
CO	10.
H	9.
N	75.3

An oil furnace for doing the same class of work showed the following analysis.

CO^2	9.8%
O	5.5
CO	.0
N	84.7

This furnace (RFH-12-36/30-75) has been used for some time for hardening dies and the atmosphere is such that it has been possible to heat them without the formation of scale from oxidation, some of the dies requiring two or three hours to become heated. In fact, the dies when heated in the electric furnace without being packed are more free from oxidation than when the same dies have been packed and heated in the oil furnace.

Fig 3 shows a recording pyrometer chart taken on this furnace and illustrates the perfect automatic control of temperature obtained without any assistance from the operator.

The following table shows outputs which may readily be obtained from the electric hardening and annealing furnaces:

Kw Rated Capacity	Kw Hrs per Ton (Average)	Temperature Deg C. to which Metal is Heated	Maximum Capacity Pounds per Hour
30	335	800	180
30	480	1200	125
40	320	800	250
40	450	1200	180
60	290	800	425
60	420	1200	275
75	250	800	600
75	400	1200	375
100	200	800	1000
100	310	1200	650
150	200	800	1500
150	300	1200	1000

While the design of the type of furnace described in this paper has been developed to a high degree, it is important that careful attention be given to selecting a furnace of the proper dimensions and kilowatt capacity when applying the electric furnace to specific work. To make a commercial success of electric heating, it is necessary that sufficient study and thought be given to the work in hand, so that an equipment may be selected of a rating such that it will be used as nearly as possible continuously at its maximum capacity. In other words, a cost of operation favorable as compared with oil or gas furnaces depends entirely upon its operation at a comparatively high thermal efficiency.

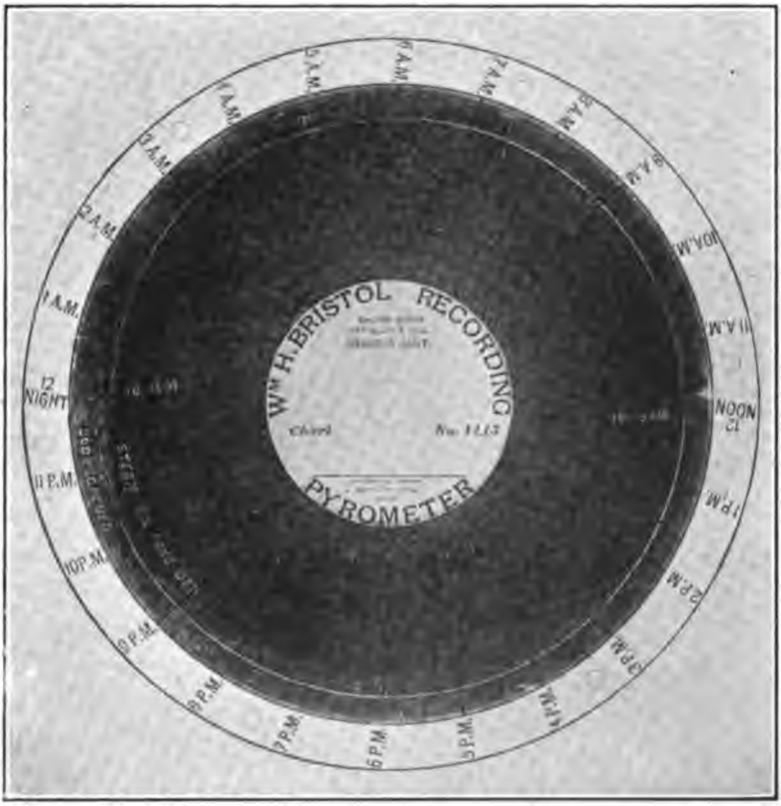


FIG 3—CHART OF TEMPERATURE IN ELECTRIC FURNACE RATED—TYPE RFH-12-36/30-75—HELD CONSTANT BY AUTOMATIC CONTROL

In order to make a proper selection it is necessary to have the following data:

Number of pounds of metal to be heated per hour
Weight of each piece
Dimensions of each piece
Kind of material
Temperature to which material must be heated
Whether material is to be annealed, hardened, tempered or forged
Voltage and frequency of circuit upon which furnace will be operated

The greater number of electric furnaces for operations requiring moderate temperatures, Class No. 2, are usually of from 50 to 150-kw capacity, and when we consider the vast number of gas and oil-fired furnaces being used in this country, the possibilities of electric furnaces as new load builders are unusually attractive. Probably there is hardly a central station man who cannot call to mind at once a number of manufacturing plants in his territory using anywhere from a dozen to seventy-five furnaces each.

Assuming that 15 000 oil and gas furnaces were replaced with electric furnaces and that the latter average 60 kilovolt-amperes at unity power-factor, with a load-factor of 60 per cent, we shall have a connected load of 900 000 kilowatts or an average demand of 540 000 kilowatts. On the basis of a 9-hour day for 300 days per year, this amounts to 1 458 000 000 kilowatt-hours which at 1 cent per kw-hr amounts to a revenue of $14,580,000 per annum.

In one manufacturing plant with which the writer is somewhat familiar there are in use about fifty oil-fired furnaces; it is estimated that if they were replaced with electric furnaces, the capacity would average about 60 kilowatts each or a connected load of 3000 kilowatts, which at 60 per cent load-factor would amount to a demand of 1800 kilowatts. On the basis of a 9-hour day, 300 days per year and at 1 cent per kw-hr this one factory offers the possibility of an increase in annual revenue to one central station, of $48,600.

The type of furnace heretofore described has been successfully applied for the various classes of work enumerated as Classes No. 1 and 2, with the exception of the melting of copper, zinc, etc., and the heating of drawing baths, but furnaces especially adapted to this class of work will have the same general characteristics as the resistance types already described.

Among the advantages which characterize the electric furnace are the following:

1st Freedom from the overheating or burning of metals

2nd Uniform heating, giving ideal conditions for tempering, hardening, forging, etc.

3rd Material reduction in the amount of scale formed during heating, resulting in saving of metal, better finished products and saving in the wear of dies

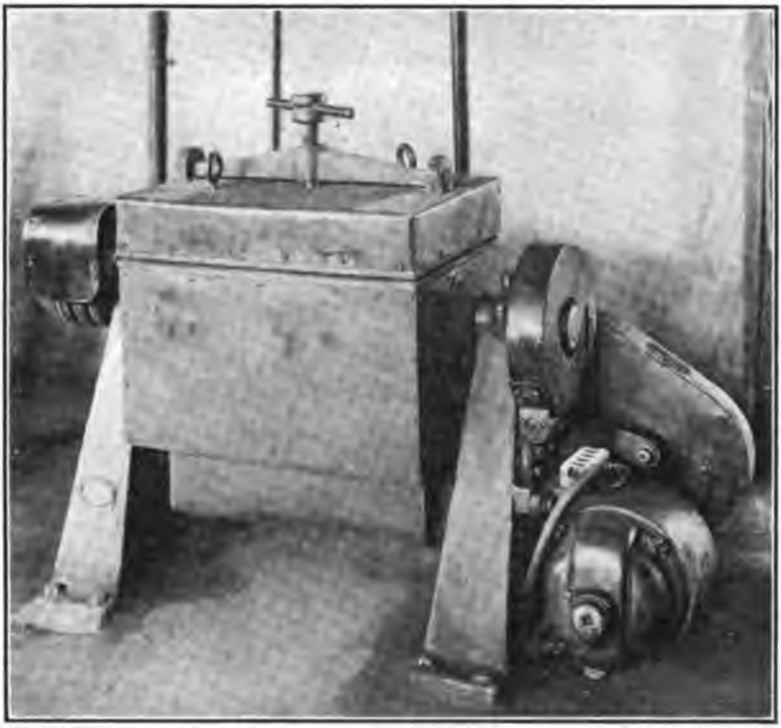


FIG 4—ELECTRICALLY HEATED SHERARIDIZING FURNACE—TYPE RHD-10 BY 10 BY 17 IN—15 KILOWATTS

4th Electric furnace gives up to the room at the most not more than 1/25 as much heat as the oil furnace, resulting in a more comfortable temperature surrounding the operator in hot weather, thus decreasing the loss of production often experienced with oil or gas fired furnaces

5th Freedom from danger of explosions which may occur in oil and gas-fired furnaces resulting in injury or loss of life, as well as from fires

6th Elimination of the complex storage and pumping systems for oil; also of the expensive compressed-air system necessary for burning

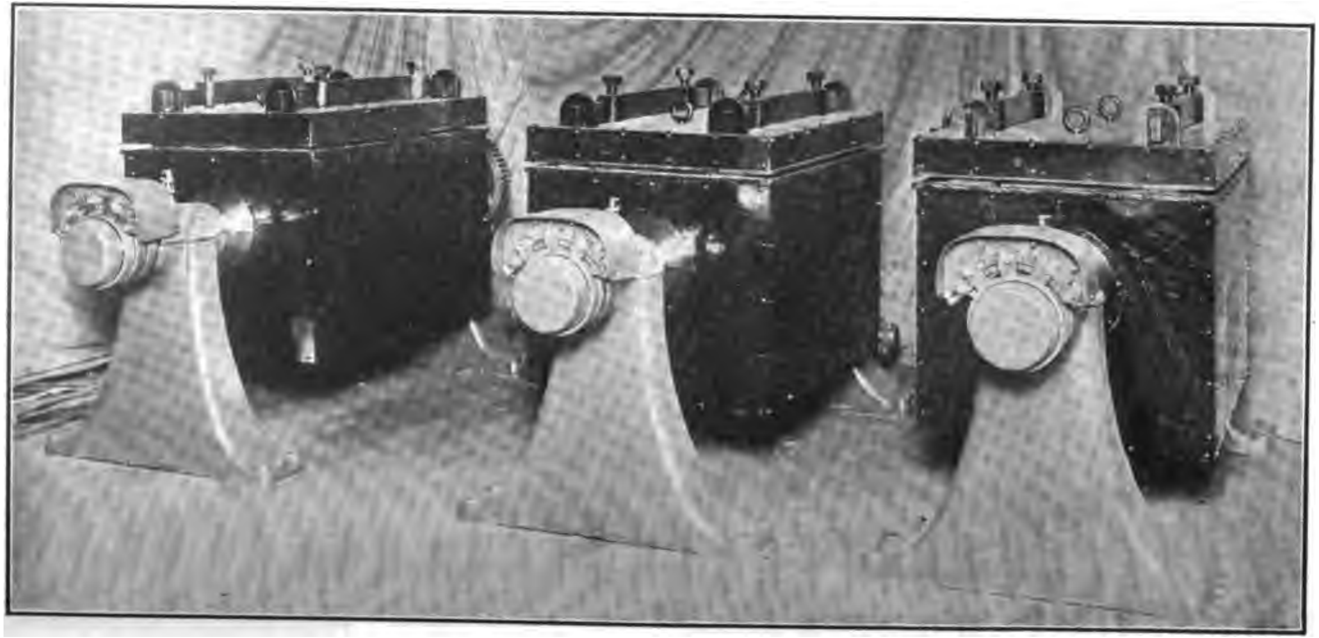


Fig 5—Electrically Heated Sherardizing Furnace—
Type RHD-24 by 24 by 40 in—50 Kilowatts

ELECTRICAL EQUIPMENTS FOR CLASSES NO. 3 AND NO. 4

Applications

The value of the electric furnace for operations given under Classes No. 3 and 4 may be effectively illustrated by specific reference to a single process for each class.

Sherardizing Furnaces

The process "sherardizing" when properly carried out is recognized to be far superior to any other commercial method of protecting iron and steel from atmospheric corrosion or rusting. Without going into the details of this process, it may be stated that its fundamental principle is the heating of the metal to be sherardized in powdered zinc, at the proper temperature. The zinc is deposited on the outer surface of the metal to be sherardized, forming a rust-proof coating. One of the important factors and one which largely determines the degree of success with which this process can be applied, is the necessity for heating the

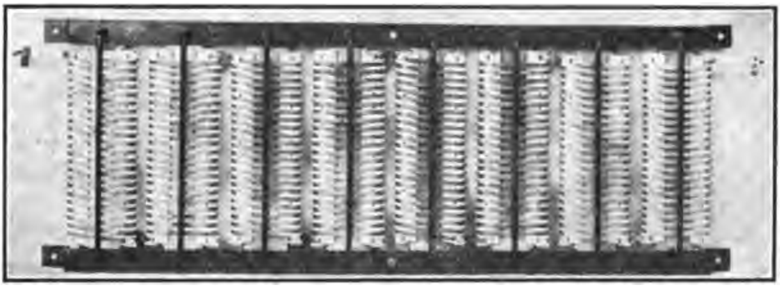


FIG 6—11-KW, 440-VOLT, ELECTRIC HEATER FOR WALL MOUNTING

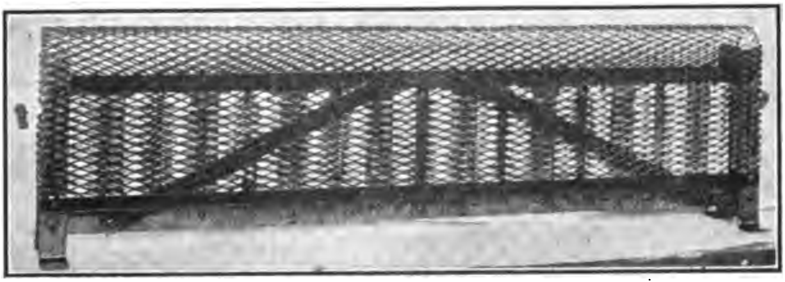


FIG 7—5-KW, 220-VOLT, ELECTRIC HEATER FOR FLOOR MOUNTING

material to a definite temperature, and thereafter maintaining the temperature constant. For this reason, the electric method of heating is ideal. The process of sherardizing is used extensively, and in many cases the heating is done at present with gas or oil, hence there is a good opportunity to increase the power station load by securing the substitution of electric furnaces for the types now used. Figs 4 and 5 show an electrically heated furnace which is used in the sherardizing plant of a large electrical manufacturing firm.

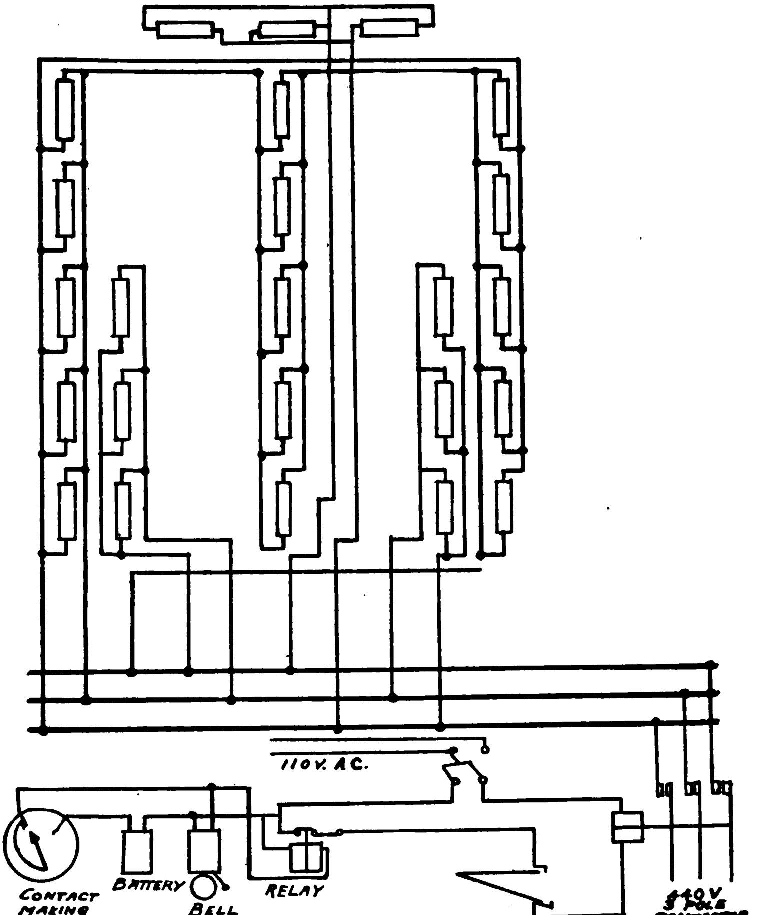


FIG 8—WIRING DIAGRAM OF HEATERS AND CONTROL PANEL FOR ENAMELING OVEN

ELECTRIC OVENS FOR BAKING ENAMEL, JAPAN AND LACQUER—CLASS NO. 4

Experience shows that an oven of this class usually requires from 50 to 250 kilowatts of heating units and when we consider the vast number of gas and oil-fired ovens being used for this work, the opportunity of re-equipping them with electric heaters appeals to us as one of the most promising fields for new load building. Taking the automobile industry alone, there is hardly a manufacturer who does not use from six to twenty ovens. The writer has in mind one such plant where seventeen gas-fired ovens are in process of being changed from gas to electric heat and this installation alone means a connected load of about 4000 kilowatts, which at 1 cent per kw-hr would mean an annual

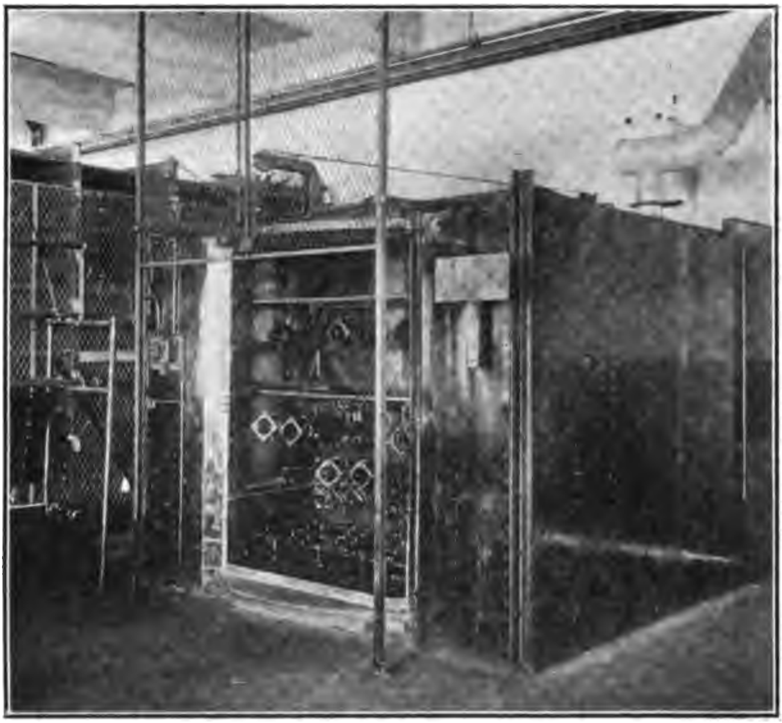


FIG 9—REVOLVING TYPE ELECTRIC OVEN FOR BAKING JAPAN ONE COMPARTMENT BEING LOADED AND THE OTHER BAKING

income of $72,000, based on 10-hour operation for 300 days per year with a 60 per cent load-factor.

Figs 6 and 7 illustrate heater units for use in equipping gas or oil-fired ovens and Fig 8 shows a representative method of connecting them.

Figs 9 and 10 show a revolving type of oven utilized for baking japan on switchboard fittings and parts for oil switches.

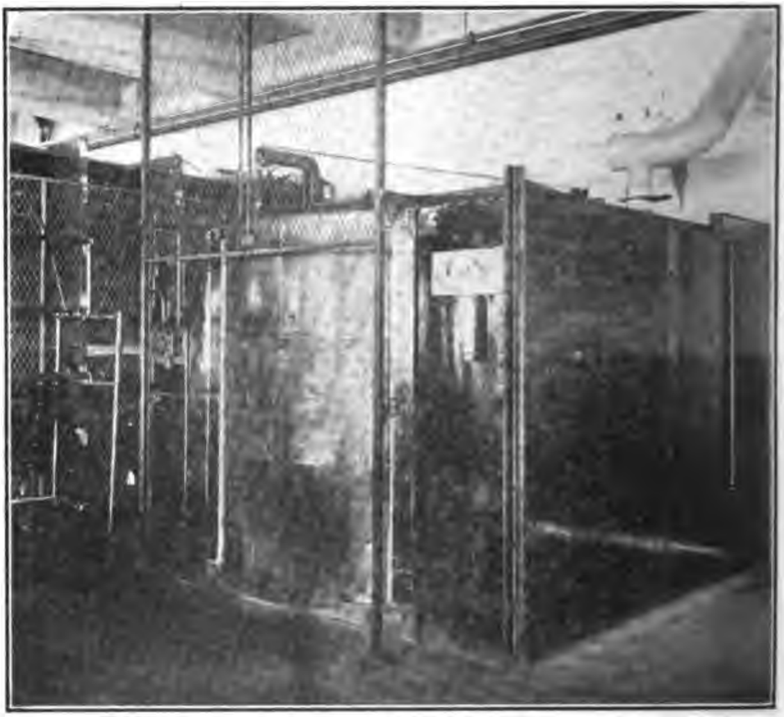


FIG 10—REVOLVING TYPE ELECTRIC OVEN FOR BAKING JAPAN
BOTH COMPARTMENTS BAKING

In the oven is a turn-table, on which is built a cylinder containing two opposite compartments in which material to be japanned is placed. When one compartment contains material ready to be baked, the turn-table is revolved by a motor drive and this enters into the heating compartment, and the other compartment of the cylinder comes opposite the opening in the oven, so that while one side is loaded and baking, the other side is open ready to be unloaded and reloaded. The compartment walls and openings in the oven are so proportioned that when one compartment is opened the other is closed, that is, if it is in the baking compartment. However, should it be desired, by revolving the turntable one quarter of a revolution from this position both compartments will be within the oven enclosure.

The wire-mesh gate shown raised in the illustration, is simply a safety device, and when in this position allows access for loading and unloading. The gate must be in the lowered position before the driving motor circuit can be completed, thereby preventing movement of the turn-table when the gate is up, and permitting it to revolve at the proper time without danger of accident to the operator or others.

For this class of work, the type of oven shown possesses the following advantages as compared with the stationary type:

The baking can be done continuously without having to bring the temperature of the oven from room temperature to the baking temperature at each loading

There are no fire risks as with gas-heated ovens, the revolving feature allows the work to be handled close to the oven so that floor space is economized and the distance necessary to carry the parts is reduced to a minimum.

In general it may be stated that the advantages of using electricity as a source of heat for baking japan, enamel, lacquer, etc., are so important that in many instances, manufacturers consider it a good investment to change from gas or oil to electricity even though there may be an increase in the fuel cost. Among its many advantages may be mentioned the reduced fire hazard, a better quality of finish and an increase in production amounting in many cases to 30 per cent.

DISCUSSION

MR. KEARNS: I am sorry that Mr. Bartlett was unable to get here. He has given considerable attention to this subject. The topic under consideration is a very important one. A large number of resistance furnaces are being placed in active service, especially by the automobile people. It is probable that there will be applications all over this country for the central station people to handle an increased load by reason of these furnaces. There is one important feature that I would like to bring out in connection with this, one not mentioned in the paper, that is of real value. The last paragraph on page 376 reads:

"With the furnace doors closed, the carbon resistor when heated to operating temperature, eliminates the oxygen from the furnace atmosphere by combining with the oxygen to form CO or CO_2. Thus by controlling the ventilation of this chamber, either a reducing, a neutral or an oxydizing furnace atmosphere may be obtained. The value of a neutral or reducing temperature in the heating of many metals, such as steel, aluminum, brass, and so forth, is clearly recognized by all who have to do with such work. Dies and tools may be tempered and hardened without scaling or oxidation; steel may be annealed with no perceptible loss due to scale."

This paragraph sets forth a most important feature in connection with the hardening of steels, especially of the high-grade type. Perhaps some of us are familiar with the barium chloride type of furnace brought out by a German several years ago. The real objection to that furnace is that it leaves a scale, especially on high-grade steel.

CHAIRMAN STEVENS: The next paper describes "A Stassano Furnace Installation at Redondo." Mr. W. M. McKnight, the author of the paper is unable to be present, and I will ask Mr. A. W. Childs of Los Angeles to present it.

A STASSANO FURNACE INSTALLATION AT REDONDO, CALIFORNIA

In the advancement of the application of electrical energy to new purposes the electrical furnace offers an interesting study and gives promise of a wide field of usefulness. Late installations show a marked improvement over the somewhat crude devices of earlier periods, demonstrating high efficiency and merit.

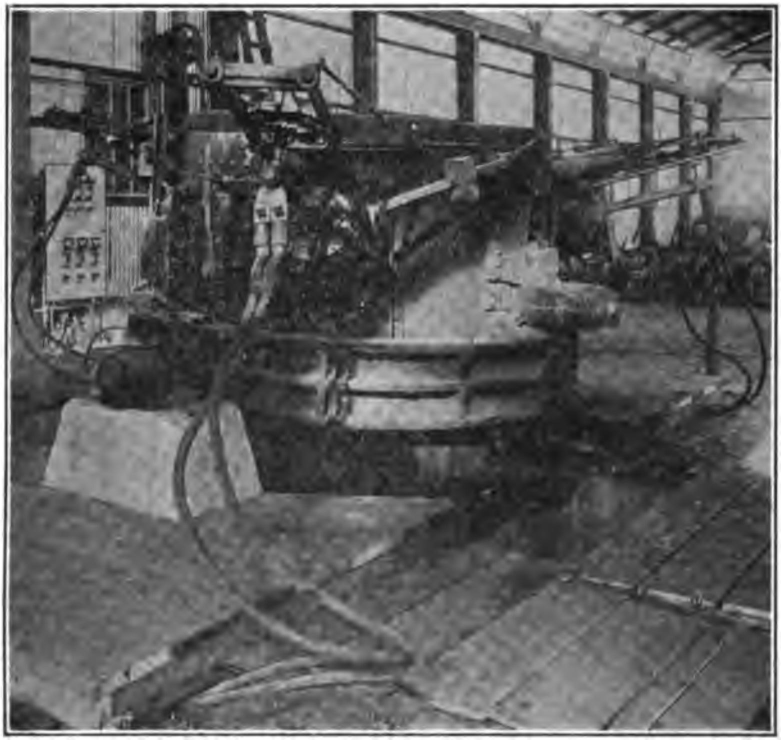


Fig 1—Crucible Furnaces

The Warman Steel Casting Company of Redondo originally used Milwaukee-type crucible furnaces (Fig 1) and California crude oil. Crucibles were limited to units of 150-lb capacity and there was uncertainty as to whether large castings could be poured successfully. The total output of the foundry was three tons per day. The high cost of crucibles on the Pacific Coast, their short life and the labor expense in handling them was a serious factor in establishing the success of the undertaking.

In November, 1913, an electric furnace (Fig 2) was installed. This was the first Stassano arc furnace used in the United States and it has been operated continuously from that time, except at intervals necessary for re-lining. Its capacity is one ton and six heats can be run daily. Deducting for loss of time in re-lining, there are twenty-four full operating days per month at twenty-four hours per day.

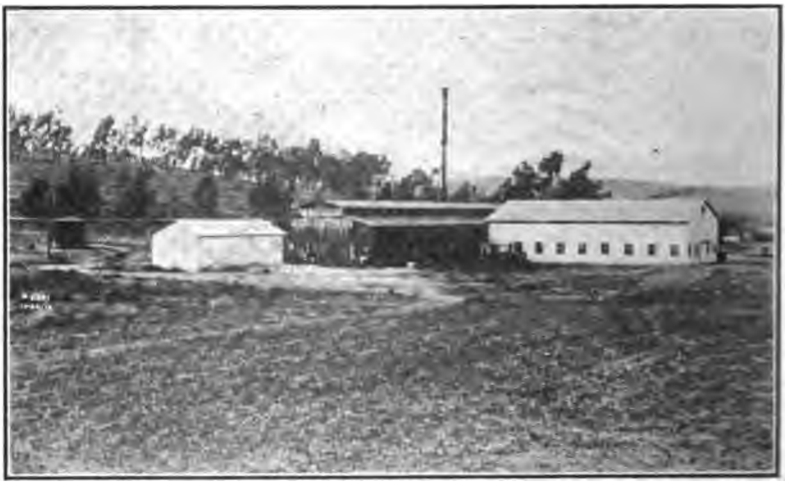


FIG 2—WARMAN STEEL PLANT

The furnace is lined with magnesite brick, which is such a good heat insulator that even an interruption of four hours will not cause the molten metal to chill and crystallize, with the consequent loss of a furnace lining. It requires two days for the re-lining, three times a month, and the best magnesite bricks are used. The cost of re-lining is $225, including labor and material, no cement being used between bricks as they are of such shape as to leave practically no crevices.

Steel castings ranging from the smallest to 1600 pounds are being founded and sold for from 20 cents per lb to 6 cents per lb, according to size. At present automobile fittings, gears, propellers, rocker arms, water-wheel buckets, and such castings as must be relied upon for the greatest strength are being founded. The high quality of the castings due particularly to their being homogeneous and of good grain, is indicated by the following letter:

Carnegie Institution of Washington
MOUNT WILSON SOLAR OBSERVATORY
Pasadena, California.

May 28, 1914.

WARMAN STEEL CASTING CO.
Douglas Building,
Los Angeles, California.

Gentlemen:—The steel castings you made have arrived and been tested, and I wish to say that these are the best steel castings we have ever seen, and we have used steel castings made by many Eastern foundries.

Enclosed find an order for thirty-two more castings to be made of same grade of steel.

Please ship by Santa Fe freight.

Yours very truly,
MOUNT WILSON SOLAR OBSERVATORY,
By A. F. Ayers.

The distinguishing feature of this furnace is that fusion is by radiant heat from an electric arc from 2 to 3 inches above the metal and approximately 24 inches from the roof of the furnace, in a closed chamber with neutral atmosphere for the chemical reactions which take place in the process of refining. This permits of closer accuracy and thoroughness in making castings according to specifications. The furnace combines the well-known features of a completely closed melting chamber, the arrangement of a 3-phase electric arc above the metal preventing the carbon and other electrode impurities from entering the metal, and allows a thorough mixing during any desired length of time. The metal reaches a temperature of approximately 3600 deg fahr. before being poured.

The furnace is suspended on trunnions in a horizontal steel ring, which in turn swings by means of another pair of trunnions, supported in the same plane about 90 degrees around from the first pair, similar to the mounting of a ship's compass.

It is tilted, for the purpose of skimming the slag and pouring the metal, by means of a geared connection (Fig 3) on

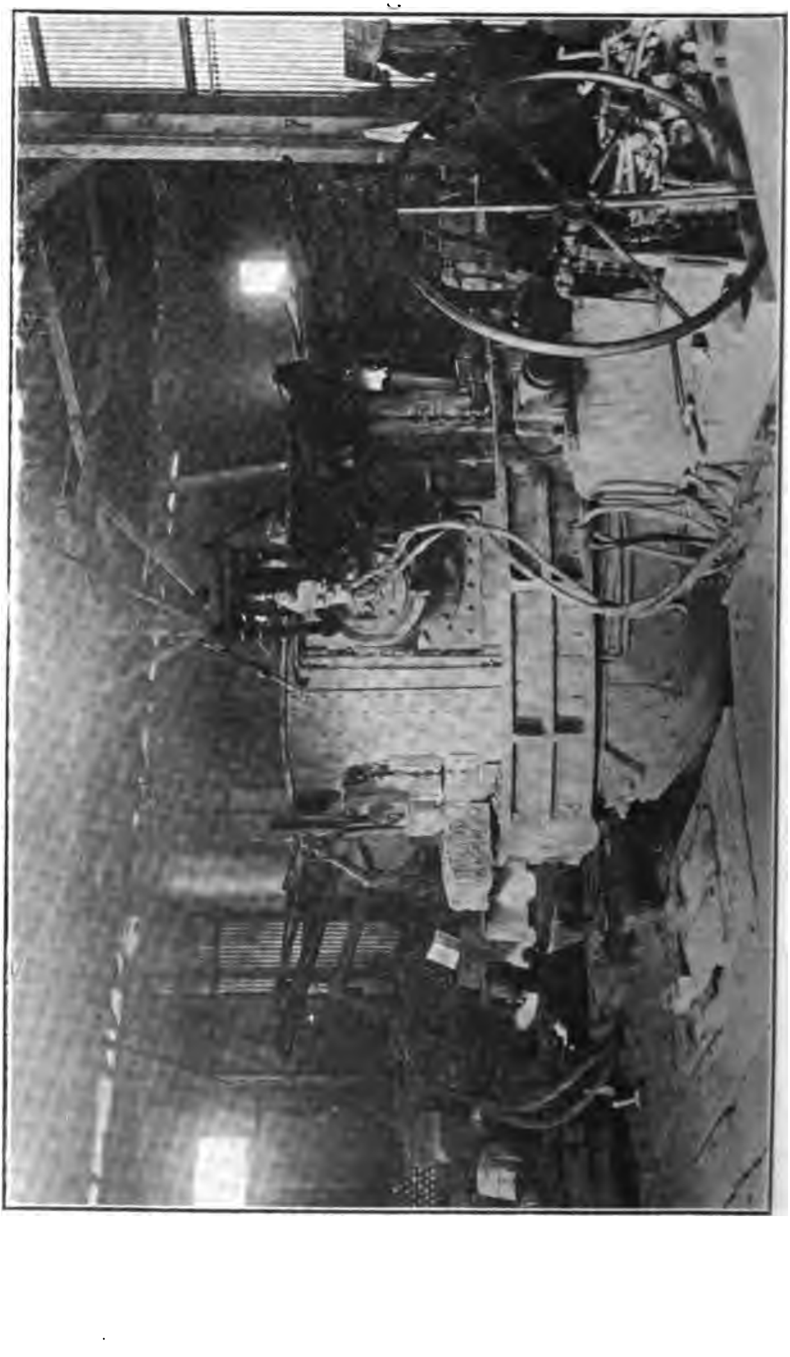


FIG 3—SHOWING TILTING WHEEL

the bottom, controlled by a hand wheel. This unique suspension places the furnace attachments above the plane of the trunnions. The three electrodes dip toward the center of the furnace at an angle of about 15 degrees, converging to a point from 2 to 3 inches above the metal. The average arc is about 10 inches, although at times an 18-in arc is drawn.

While the original furnace was closed at the top, the Warman Company has altered it so that the roof is removable and additional furnaces to be installed shortly will embody this improvement.

The carbon electrodes are 3½ inches in diameter and 6 feet long and burn down to stubs about 18 inches long. The electrodes enter the furnace through a water jacket and are fed individually by hydraulic pressure regulated from control valves at an operator's stand. The consumption of water from the city main is almost nil, amounting to about $3 per month, the water being circulated by a 2-hp motor-driven pump through a cooling tower to a tank which supplies the water jackets and the hydraulic control, under a head of 20 feet.

The current consumption of the furnace is from 800 to 2000 amperes per terminal on a 3-phase 150-volt circuit. Current is supplied through flexible cables connected to a marble switch panel supporting three single-pole double-throw and one 3-pole double-throw knife switches of heavy construction, connecting transformer secondaries in either inter-connected star or delta, at pressures of 150 volts and 100 volts respectively, with the furnace. Standard indicating instruments are in use. To keep the balance, a ground connection is tapped through an oil switch and overload release, to the middle point of the Y on the main circuit.

Heavy copper bus-bars lead from the switches to the secondary terminals of three 100-kv-a Westinghouse transformers which are specially designed, oil-cooled, and wound for 10 000 volts primary and 110 to 150 volts secondary.

The entire consumption for the installation is registered by a primary meter which together with the transformers is placed in a galvanized iron substation and controlled by a 10 000-volt Kelman oil switch with overload trip coils. The 10 000-volt service to the plant is protected at the pole by a fused Baum pole-top switch operated from the ground. The plant is served from

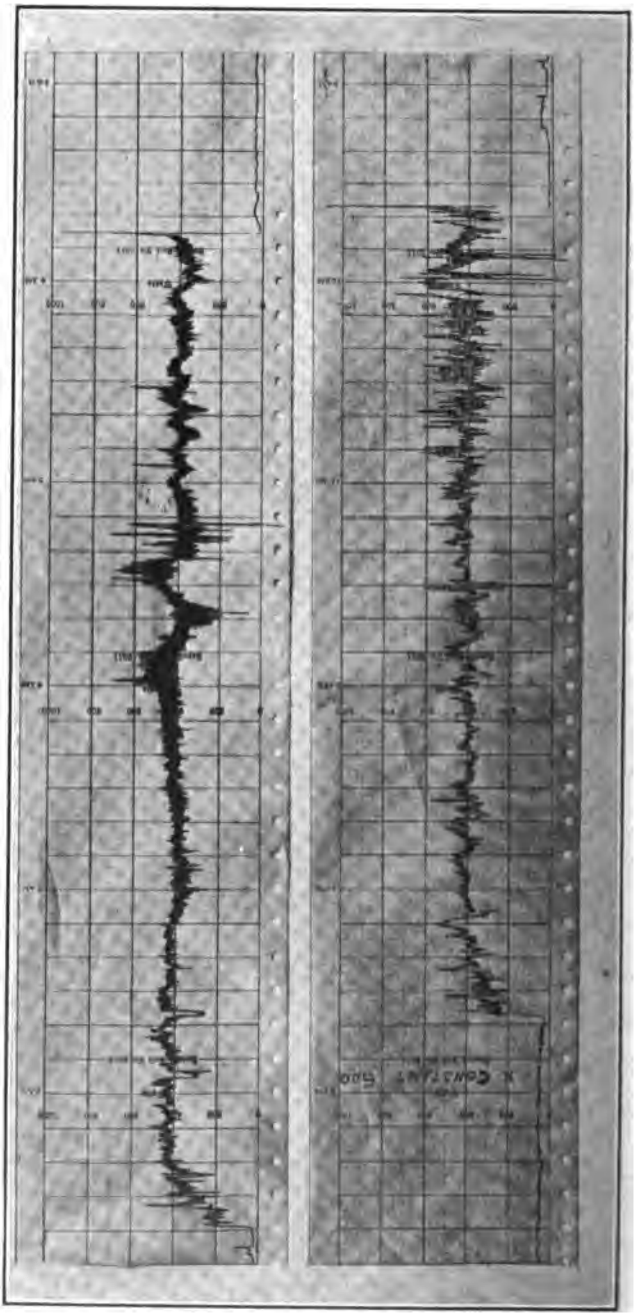


FIG 4—CHART SHOWING VARIATION IN LOAD FROM DAY TO DAY

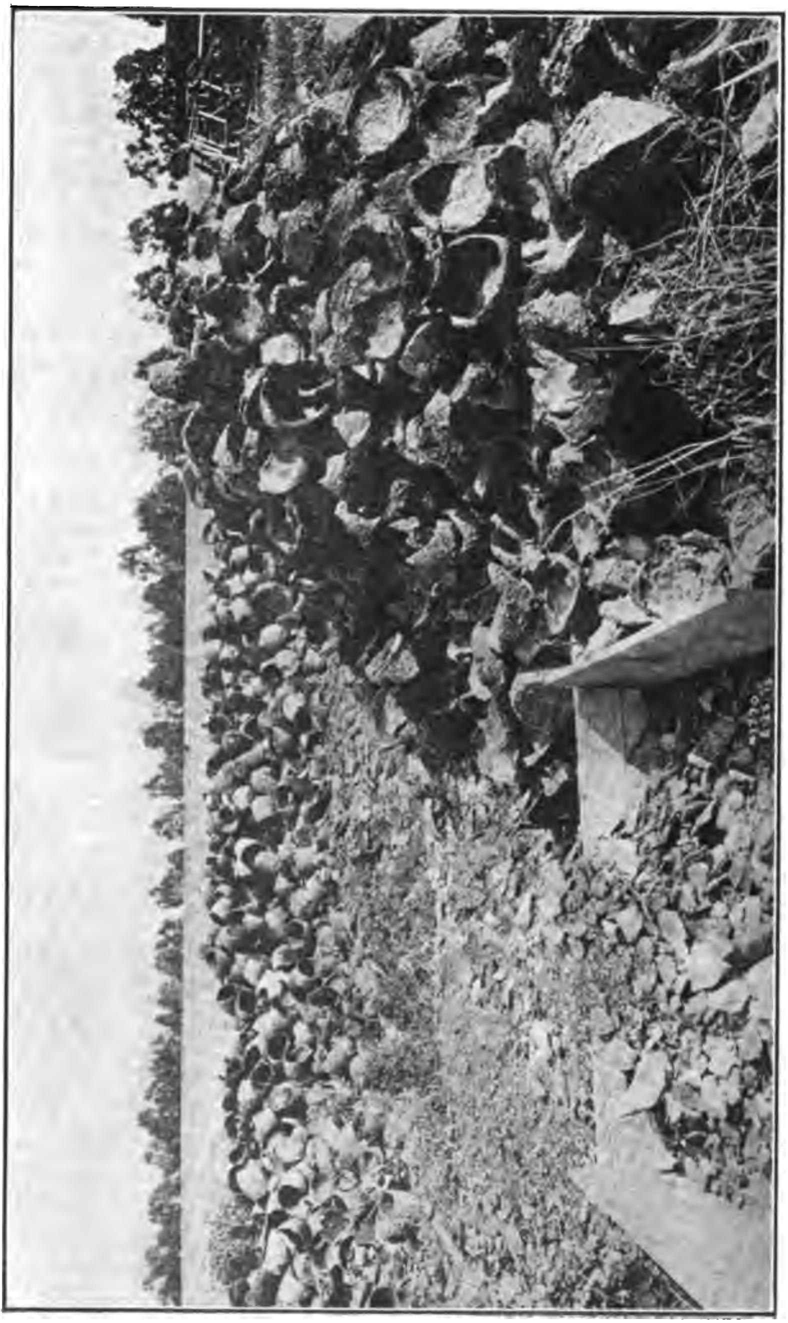


FIG 5—CRUCIBLE GRAVEYARD

a double circuit 10 000-volt transmission line one-quarter mile distant. Provision is made, in case of emergency, to connect to either transmission line circuit through a pole-top Baum switch. The double transmission line is fed from two nearby substations, each having an approximate capacity of 2000 kilowatts. These substations are supplied from the Southern California Edison Company's 10 000-volt and 33 000-volt transmission lines.

Heretofore scrap steel has been a drug on the market in Southern California, the majority of it being shipped East, and this industry has the advantage at present of an unlimited supply of the best scrap steel, at from $7 to $10 per ton.

Aside from steel, ferro-silicon, ferro-manganese and anthracite coal having 90 per cent of fixed carbon, are ingredients necessary to the finished product.

There is very little variation in load from day to day, as shown by graphic chart (Fig 4), the average demand being about 225 kilowatts. The fluctuation of the load, which is non-inductive, scarcely affects the regulation of the 10 000-volt line.

Electrical experts and particularly those engaged in the commercial branches of the business, believe that this installation has established the value and merit of the electric furnace and placed it beyond the experimental stages, and that it must now be regarded as one of the great current-consuming commodities.

CHAIRMAN STEVENS: The fifth and last number on our program for the Session will be a paper prepared by Mr. F. T. Snyder of Chicago, on "Electric Furnace Power Loads."

ELECTRIC FURNACE POWER LOADS

EXTENT OF THE BUSINESS

Present

While it somewhat understates the facts, it is convenient to remember that there are about a million horse-power of electric furnaces in regular operation throughout the world; an amount of power quite sufficient to justify serious consideration from power producers. This power is used in the making of aluminum, calcium carbide and other carbides, the fixation of atmospheric nitrogen, the making of steel and a long series of metallic alloys, and to a considerable extent in the high temperature production of special chemical products. The power used by the aluminum, carbide and nitrogen industries is largely produced directly by the users. The power for making steel, alloys and chemicals is generally purchased from power companies and is the matter of special interest here.

Future

Among those who are in contact with the more recent installations of electric furnaces in the lines naturally tributary to purchased electric power, it is quite evident that there now exists the possibility of a prompt development to large proportions. How rapidly this development will arrive and what proportion of it will become purchased power will be largely determined by the attitude and policies of the power companies. It is the purpose of this paper to furnish some of the facts which should properly form the basis for power company judgments along these lines. The electric furnace industry is rapidly growing and changing, and it is naturally difficult for an electric power engineer, busy with many lines of general power application, to obtain the opportunities for first hand determination as to what are the fundamental and what are the superficial and temporary conditions in electric furnace applications.

The United States has at present electric steel-making capacity under 100 000 tons per year. The total production of steel from all kinds of fuel furnaces is some 30 000 000 tons. A number of years ago it became evident that steel, when required in small quantities, one or two tons a day, could be made at less cost in electric furnaces than in fuel furnaces. Three years ago electric furnaces were put in operation which could make steel up to outputs of 10-tons a day cheaper than was possible with fuel, under normal price conditions. During the last year electric steel furnaces have been operating which make it quite evident that steel at any tonnage rate can be made at a lower cost than is practical in fuel furnaces. That is, it appears that in the near future electric furnaces of certain types will make steel in large tonnages at a lower net cost than open hearth and Bessemer converter equipment can do it. In other words, as rapidly as the conviction of the truth of these facts grows, and the installations can be financed, the steel melting business of the United Statese is to become largely electrical.

During the last year electric furnaces have been regularly operating in commercial service in which an open interior of considerable volume has been maintained at temperatures around 2500 deg centigrade. This has made possible on an industrial scale, chemical operations of great importance that do not take place at lower temperatures. Coming at a time when chemical supplies from Germany were cut off by the war, this type of furnace opportunely met a need with a reliability and with costs of production that indicate an extended use as rapidly as the installations can be prepared.

A great deal of thought and effort has been put into electric furnaces for melting copper alloys, and while operative furnaces have resulted, it has become quite evident that the commercial power load in this direction will be of relatively small importance. This is due to the commercial conditions of the copper alloy business. Electric furnace costs, per ton of product, for installation and operation, increase rapidly with decrease in size of furnace. Copper alloys are melted in a large number of small plants. Each plant makes small quantities of a number of different alloy mixtures and thus requires several small furnaces, each operating part time. The small power demand and low-load factor make the electric power rate too high in these plants to enable the electric furnace to compete with fuel melting. There are a few plants melting a number of tons per day of the same copper alloy mixture and the high efficiency and low metal loss of well-designed electric furnaces make it certain that such service will become electric. The small number of such plants makes the total possible power load in this direction quite limited.

There is another class of alloys, containing one or more of the light metals, either combined with iron or iron free, which may be expected to become of great commercial importance in electric furnace work and in producing satisfactory loads for power producers. These alloys are largely used in steel productions and are becoming of increased importance in the construction of air craft equipment of various types. Owing to the relatively high value per pound of these alloys, their production will stand a relatively high power rate.

In the aggregate a large amount of annealing and other heat treatment work is being done in fuel furnaces of low thermal efficiencies, many of them down to 5 per cent. This is a field for electric furnace application that is being developed, and may be expected to extend to fairly large loads in metal manufacturing districts.

In these directions the near future of electric furnaces will become of rather large interest to power producers, and it is important to the industry that the power producers should understand clearly in a broad way the bearing of certain fundamental power conditions on the development of this load.

CHARACTER OF SERVICE

Load Factor

The generally low efficiency of night work in many lines of manufacture makes it difficult in some cases to get electric furnaces into 24-hour operations. This usually means 12-hour operation, even where the men generally work 10 or 9 hours, as the furnace can take current for 2 or 3 extra hours in the morning during the heating-up period. Many electric furnaces are intermittent in the absorption of load. The material is treated in charges and the furnace has to be shut down while the product is being removed and a new charge introduced. In actual experience electric furnaces show an annual load-factor on 12-hour service of about 40 per cent, and about 70 per cent with 24-hour service.

Peak Time

Due to the intermittent character of the usual service, electric furnaces can generally be shut down during peak time without inconvenience. Practically all sorts of large electric furnaces can be shut down from two to four hours without serious loss of temperature. Under the generally existing schedules of power charges, it is well worth while for the user to operate electric furnaces on an off-peak basis.

The most general and at present the most rapidly growing electric furnace service is for melting steel in foundries. It has been found difficult to do satisfactory molding work at night. The plan which has worked out well is to do all the molding on the day shift and at night melt and pour only. Under this plan the molders do not lose time while the pouring is being done and the practical difficulties that were expected with this plant have been generally overcome. The result is an all-night load for the power producer. The usual power hours are from 7 p m to 6 a m.

Voltage

Due to the size of the loads it usually happens that existing service lines are too small and special lines have to be installed. Even with the highest furnace voltages in practical use, the amount of copper involved generally makes low tension service impracticable, even at locations quite close to substations. Consequently, as the voltage has to be reduced at the furnace, the voltage of the primary service is unimportant from the point of view of furnace equipment. Any available voltage can be used. Furnaces are now taking power from the highest to the lowest transmission voltages.

Alternating or Direct Current

Substantially all industrial furnaces are at present operating on alternating current. Alternating current presents no disadvantages in furnace operation, while the convenience of change in potential, and the facility of measurement and regulation are of great advantage. There are several reasons why in the future furnaces may be expected to develop toward direct-current operation for higher efficiencies, but at present and for some time to come alternating current is the practicable form of electric furnace power supply.

Frequency

Up to about 1500 kilowatts, arc and resistance furnaces can be built for 60 cycles. Above that, the design for 60 cycles becomes difficult and the furnaces expensive. Furnaces at 25 cycles have been built up to 15 000 kilowatts each. Induction furnace design is more limited, and special low frequencies are required at 500 kilowatts and over.

Phase

The large majority of industrial electric furnaces are operating from single-phase service. This is especially true in the larger resistance furnaces making special chemical products, and of the carbide and alloy furnaces. A number of furnaces using three phases directly in the furnace are in use for melting steel. Two-phase furnaces have been built, but it is not probable that their use will extend materially, as they have the disadvantages of the 3-phase types and are without the advantages of the single-phase forms.

SINGLE PHASE FURNACES

Form

The bulk of the energy losses in an electric furnace is connected with the means used for getting the power into the furnace. There obviously must be at least two electric connections, one to get the current in and the other to get it out. In industrial furnace design the furnace charge can in most cases be connected directly to one terminal. This reduces the number of movable electrodes to one, as the limiting case. From engineering considerations, a single electrode furnace should be expected to have the highest efficiency and in practice this is found to be the case. A single electrode furnace must necessarily be supplied with single-phase current. The practical question that ought to be clearly understood by power producers is that this higher efficiency will eventually force all electric furnaces onto a single-phase basis.

It may be well in the beginning to appreciate the fact that this question of three electrodes or one electrode is not a matter of rival manufactures of the different types, each stoutly asserting the particular merits of his own device. The patent situation in this country is such that all manufacturers are quite free to build either single or three-electrode furnaces or both, as seems to them best for their customers. Actually each of the larger furnace manufacturers has at one time or another built both single-phase and 3-phase furnaces. Both single and 3-phase furnaces are at present built and sold by a number of competing makers.

Power Supply

Electricity can be generated and transmitted 3-phase with a lower capital investment than can be done with single-phase equipment. The difference is about $2 per year per kv-a of demand under the usual electric furnace conditions. This has lead to the development of 3-phase generating equipment and the adaptation of lighting and power loads to this service. With lighting a number of small diversified customers and lamp outlets make the proper distribution of the loads over the phases relatively easy. With power it was not nearly as easy. The old direct-current motor had proved both cheap and reliable and entirely satisfactory control methods were in use, before 3-phase distribution became general. Even to-day it is not at all easy for a power salesman to change a plant from direct-current to alternating-current motors.

Railway Service

Where the motor was doing work of an intermittent character, stopping and starting with variable speeds, it was and is now still more evident that the direct-current motor has characteristics that give it distinct advantages in this class of service. When in addition the motor had to be portable, when besides doing its work it had also to move itself about,' the greater weight and lower efficiency of the alternating motor placed it at distinct commercial disadvantages. These are the conditions of railway service and while the battle still goes on, the developments of the last few years make it quite evident that in railway service the facility and convenience of 3-phase generation and transmission are not the only factors in deciding the adaptation of types of railway motor equipment. In this, as in all lines of industry, the type of equipment that survives is the type that produces the largest net profit for the community, irrespective of how that profit is divided among the active participants.

Present Practice

In metal melting and the production of alloys a considerable majority of the operating furnaces are now single phase. In abrasives and alloys and heat treatment substantially all the regularly operating furnaces are single phase. The proportion of single-phase furnaces is steadily growing in the face of almost universal 3-phase power generation. As the electric furnace types have developed under free competition, there obviously must be solid economic reasons for this situation. These can be found in the fact that single-phase current appears to be naturally better adapted for furnace work than 3-phase current, just as direct current is better adapted to street car work, and that the saving due to the use of single-phase current materially outweighs the apparent convenience of using three-phase directly in the furnace.

It should be noted that many single-phase furnaces are running in groups in which the individual furnaces are distributed among the different phases of the generating system. Also that standard 3-phase equipment will deliver 75 per cent of its 3-phase capacity in the form of single-phase current.

Savings of Single Phase

Single-phase current in furnace work has no direct benefit in itself except as it permits the use of a single electrode. The loss of power, the amounts of electrode and refractories used and the labor needed per ton of output are roughly proportional to the number of electrodes used. This makes the cost of operating a 3-electrode furnace much higher than the cost with a one-electrode furnace. This is borne out by many records of practical operation extending over considerable periods of time. The reasons for this difference in cost are simple and when pointed out are readily understood. The commercial effect of this difference is of great importance both to the users of electric furnaces and to the sellers of electric power for this purpose.

The potential difference permissible in an electric furnace is limited, as in the case of electric motors, by considerations of safety for the operators of the equipment. This with the same degree of safety permits the voltage of the single-arc furnace to be about twice that of each of the arcs of a 3-phase furnace. The greater heat losses of a 3-electrode furnace make necessary the use of about 50 per cent more power per ton of product, so that each electrode of a 3-electrode furnace carries about the same amperage and is the same size, if made of the same material, as the single electrode of the single-phase furnace. Electrode consumption is largely a matter of surface burning. The 3-electrode furnace with the same electrode material, has three times the surface to burn and the electrode consumption would naturally be expected to be three times as high per ton of product.

In actual practice, it has not been found economical to use the same material for the electrodes of a 3-electrode as for a one-electrode furnace. Electrode cost is made up of two items, the purchase price of the electrode material itself and the heat lost through the electrode during its life. The larger surface burning in the 3-electrode furnace makes the cost of the electrode material of first importance. Graphite electrodes cost three times as much per pound as do carbon electrodes. Where so much is to be burned the use of the cheaper material is an enforced necessity. The relative conductivities of carbon and graphite are such that electrodes of somewhat more than double the diameter are required with carbon. In good engineering practice the 3-electrode furnace has about 6½ times the electrode surface of a single-electrode furnace of the same daily output Carbon burns more readily than graphite, so that the actual electrode consumption ratio in the best practice is about 9 times as many pounds of electrode per ton of output for the 3-electrode as for the single-electrode furnace. The one graphite electrode costs three times as much per pound as the three carbon electrodes, so that the net result is that the electrode cost per ton of product for 3-phase furnace is three times the cost for a single-phase furnace.

The principal unavoidable heat loss in an electric furnace is through the electrodes. Just as a copper wire conducts electricity better than air, so a carbon electrode conducts heat much better than would the air in an empty electrode hole. With three electrodes of the same size as the single electrode, the heat loss would obviously be three times as great in the 3-phase furnace as in the single-electrode furnace. Actually, the ratio is much higher, due to the economic necessity of using carbon electrodes in 3-electrode furnace. As used in the best actual practice the cross sectional area of the three carbon electrodes of a 3-electrode furnace is about 15 times the cross section of the one graphite electrode of the single-phase furnace. Carbon has about half the heat conductivity of graphite, so that the heat lost through the three electrodes is about 7½ times the heat lost through the one electrode. However, with the single electrode furnace a contact is also required to connect the charge with the circuit. This contact loses some heat, hence the net result is that the heat loss due to the introduction of the current in a well designed 3-phase furnace is about 5 times this heat loss in a one-electrode furnace.

Most of the refractory wear in an electric furnace is on the roof. The sides are banked up with relatively cheap material that keeps the walls from wearing. This roof wear is largely around the electrodes and is partly due to the hot gases that escape between the electrode and the roof. With three electrodes this wear of the roof near the electrode would be expected to be three times as large with a 3-electrode furnace as with a one-electrode furnace. In regular commercial operation the ratio of lining wear is higher than three to one. This is in part due to the fact that 3-phase current is used with three electrodes. This gives a difference of potential between electrodes 70 per cent higher than the potential from each of the three electrodes to the bath. Fire brick at white heat is a relatively good conductor of electricity, having a resistance of about one ohm per cu-in. Consequently, a considerable current flows between electrodes through the hot roof material. This current flow further heats the roof just as the current heats the filament of an incandescent lamp, and heats is at just the places where the roof is already at the highest temperature. To reduce this leakage current between electrodes, the electrodes of a 3-electrode furnace are moved as far apart as practicable. The further they are moved apart the nearer the arcs come to the walls and the higher the cost of wall refractories per ton of product. With a one-electrode furnace the arc is in the center at the maximum distance from the walls.

The electrode heat loss is a considerable part ,of the total heat used in an electric furnace. The amount saved by using one electrode materially increases the number of heats put out per day. The fewer and smaller electrodes to be handled in actual practice, do away with one man from the furnace crew. The reduced refractory renewals naturally result also in a material saving of labor. The sum of these effects is such that for the same holding capacity of furnace, the cost for labor per ton of product in good furnace practice is about one-third as much with the one-electrode furnace as with the 3-phase furnace.

Regulation

The variations in current in an electric furnace are due to changes in conditions in the furnace. In a melting furnace the gases given off by the metal cause the slag to swell up in bubbles. In practice these slag bubbles rise up an inch or so. In the 3-electrode furnace the arcs are about 2 inches long. The arc blows the slag away a half-inch so that the electrode is about 1½ inches from the slag. When a bubble swells up under the electrode the arc transfers itself to the bubble. With the top of the bubble only one-half inch from the electrode, the length of that arc momentarily drops to ½ inch, which is one-fourth of its normal length.

In the 3-electrode furnace each arc is in series with one of the other arcs. With one arc on the top of a bubble and the other series arc normal the joint resistance of the two arcs drops to ⅝ of the normal value. The current jumps to 8/5 or 160 per cent of its normal value and as the bubble breaks the current goes back again to normal. With the one-electrode furnace the corresponding arc is 8 inches long. When a bubble of slag swells up an inch the length of the arc is reduced to 7 inches. The rise of current is ⅛ or 12½ per cent of the normal value. The one-electrode furnace therefore never trips out the circuit-breakers protecting it.

With the 75-volt arcs used in the 3-electrode furnaces the arcs break at a length of about 3 inches. With the 150-volt arcs used in the one-electrode furnace, the arc will pull out to 14 inches before breaking. When melting down scrap, the long arc transfers itself without breaking from piece to piece as the scrap melts, while the short arcs of the 3-electrode furnaces go out when the scrap melts more than 3 inches away from them. The three arcs of a 3-electrode furnace are mutually dependent, as each is the return circuit for the other two. When the one arc breaks, the current drops in the other two also. For these reasons the single-electrode furnace makes a much more uniform load on electric power service than does a 3-electrode furnace. These changes of condition in the furnace are too rapid to be followed by a mechanical regulator moving the electrodes.

Single Phase Service

What has been stated here as the great commercial advantages of the one-electrode, single-phase electric furnace can be readily checked by any power salesman on inspection of the actual operation of such furnaces. While these facts have developed only in the last three years and while they are so remarkable as to excite surprise, the furnace records on which they are based cannot be eliminated by the simple process of refusing to look at them. The real question is, "What are the power companies going to do about it." Are they going to insist that the consumer buy 3-phase current, which will substantially double his furnace operating cost, or are they to perform the true public service of supplying the form of energy which is actually in demand for this purpose.

Central station companies having a 4-wire, 3-phase distribution system can readily furnish the necessary single-phase service by means of a suitable arrangement of transformers. In other cases requiring the use of motor-generator equipments, the general introduction of the electric furnace would be greatly accelerated if the central station companies would make the needed investment in this apparatus, even if it becomes necessary to charge the furnace user a reasonable rental for the equipment.

For mechanical power the power companies have been largely successful in forcing the use of induction motors to fit the 3-phase line service. These motors had for constant speeds certain advantages—absence of commutator and simplicity of construction. For street car service the power companies have been utterly unable to force the direct use of 3-phase current on the motors, and the revenue of many years was lost to the early power companies by forcing the transit companies to install their own direct-current stations, in the days when the operation of converters was uncertain and precarious. It appears from the present operating furnace records that the commercial advantages of single-phase electric furnaces are too great for the power producers to permanently force the use of 3-phase current. As furnace loads are fairly large, it is quite possible that power companies could compel quite a number of furnace users to install their own generating equipment. In the long run the steel plant using the more efficient type of furnaces will drive out of business all competitors using the less efficient equipment. The power company can at the start get more income from the few most favorably situated users on a 3-phase basis, due to the higher kw-hr consumption per ton of product. But the use of the single-phase furnace so broadens the field of possible application, that the final permanent income must be many times larger on the basis of single-phase furnace installations.

In the judgment of the writer the power companies of today are too broad in their outlook, too keen for income, too willing to be of service to the community to delay the coming of this new load on a basis that will be solidly permanent for the furnace user, the furnace builder and the power producer.

Mr. Snyder (continuing): Several years ago we found that if we use a single-electrode electric furnace in place of a 3-electrode furnace we increase the thermal efficiency from around 35 to about 60 per cent. This necessarily meant a single-phase power load. We had a good deal of difficulty at that time in getting the power companies to understand that it was good for the commercial end of their companies to sell single-phase current. This paper, as you have noted, is an abstract of the reasons why it pays the power company to sell single-phase current for electric furnace use. The important thing in the electric steel-melting business is that the competition is not between single-phase and 3-phase electric furnaces. That is not the deciding factor. The deciding factor is the competition between the most efficient type of electric furnace and the fuel oil or gas steel-melting furnace. The 3-phase steel furnace can only under exceptionally advantageous conditions, compete with fuel, while the single-phase furnace can very generally, indeed almost universally, compete with fuel in the melting of steel. That is very well illustrated by some of the data in the paper which has just preceded mine. In that paper is given the cost of re-lining a furnace, and that figure adds to the cost of making the steel about $4.50 a ton. That re-lining cost with a single-phase furnace would come to about $1.00 per ton, so that using a single-phase furnace instead of a 3-phase furnace for this item of refractories alone, gives a margin of somewhere in the neighborhood of $3.50 per ton of steel, which is very valuable in competing with a fuel furnace. The point to emphasize is that the competition is not between the 3-phase and the single-phase furnace, but that the real competition is between the single-phase electric furnace and the different types of fuel furnaces.

CHAIRMAN STEVENS: These three papers touch upon a very important subject. I hope we shall have considerable discussion.

DISCUSSION

MR. KEARNS: I would like to say a few words in reply to Mr. Snyder. I personally do not think it is a question of the cost of re-lining the furnace that determines the choice between a 3-phase and a single-phase furnace. I think that in dealing with prospective customers we should not argue the cost of any particular type of furnace. We should try to show them the real advantages that can be secured in the improvement of the material that they propose to use, because, primarily, an electric furnace is designed to give you a much better grade of high-class steel.

So far as securing single-phase or 3-phase energy goes, it is, of course, appreciated that nearly all operating companies are in a better position to supply 3-phase energy. Therefore, the general proposition will be to supply 3-phase furnaces so far as practicable. On the other hand, the manufacturing companies are able to supply the apparatus, making it possible to secure single-phase energy without unbalancing your system, so as to allow the use of single-phase furnaces when these seem to be preferable.

MR. H. O. LOEBELL, New York City: In Class No. 1, Subdivision B, Mr. Bartlett has included a classification that does not belong there. "Heating steel bars for forging, welding and upsetting" should be taken out. That operation requires the highest temperature and I believe it would be unjust to the Section to give the impression that this furnace is at such a stage that everybody can buy and operate it. There have been some difficulties about the furnace in practical operation. The manufacturers have not been able to get a refractory that will stand the temperature. I would advise the members of this Section to wait until a better insulator and a better refractory has been developed. For the balance of Class No. 1, "Hardening high-speed steel, melting copper, gold, and so forth, heating bolt and rivet stock," the furnaces are on the market today and they are a success.

I want to direct your attention also to Class 4, "Applications requiring temperatures from 100 to 250 deg cent., baking japan, enamels and lacquers, baking insulating compounds, drying out impregnated woods, and vulcanizing and heating moulds." I believe that today there are on the market installed and in operation close to 25 000 electric units operating enamelling ovens. I have in mind an installation of close to 6000 kilowatts, and it is doing splendid work. There is another line of business under Class 2, Division A, "Annealing copper, brass, carbon steel, high-speed steel and malleable iron," that is most desirable. With the electric furnace we get almost ideal conditions. In general the business of electric furnaces requires closer application than it would appear. I want to warn you gentlemen on that point. I have spent about twelve years in the industrial gas-engine business. I know some of the problems. A man wants a furnace capacity of a thousand pounds an hour, and you must figure he will require a furnace that will take a maximum capacity of 200 kilowatts. Suppose he starts in with crank shafts. They require one heating. After they have finished, he will take the same furnace and put in axles, but instead of being able to put in thirteen pairs he can not put in more than six. The furnace has been cut in two and the consumption per ton is increased. Then there are other factors like pulling out five or six blanks. All this requires very close application and the guarantee as to consumption per ton must be carefully made. All of those problems, however, can be worked out.

MR. A. W. CHILDS, Los Angeles: I have nothing to add to the statements made in the paper. The people who are operating these furnaces tell us that the grade of steel they are putting out is very high. The product is homogeneous, and they get a high price for it. They are satisfied with their operations. They claim that they are making money. It offers a very good load for us.

MR. DELLPLAIN: The subject of electric furnaces is in my estimation one of the most important that could come before this Commercial Section today. I think in the course of the next few years we shall be talking more about electric furnaces than anything else. So far as the power end of our business is concerned, I do not believe there is a more important committee under the control of the Power Sales Bureau than the committee which has this subject in charge, and it is unfortunate that the hour is so late that we cannot go into the subject more in detail. I am much interested in the possibilities of the steel casting business as it relates to the electric furnace, in view of the fact that we are at the present time attemping to promote such a company in central New York.

The use of drop forgings and malleable castings in the manufacture of automobiles and machine tools is today quite a factor, and after a careful canvass of the market I find that there is absolutely no question whatever as to there being a sale for steel castings in small sizes among such manufacturers. The only question in their minds is the possibility of securing steel castings of the proper quality.

Drop forgings and malleable castings are necessarily of cumbersome design in order to secure the tensile strength required. If it were possible to supply them with a high quality steel casting, it would allow the use of a part very much neater and lighter in weight, and as I see the proposition, the electric furnace, whether 3-phase or single-phase, is the logical means of producing steel of high quality for casting purposes.

Mr. Kearns: I should like to ask Mr. Loebell to tell us something more definite with regard to the use of the furnace mentioned in Mr. Bartlett's paper. I should like to know if he can name an instance where the lining has not stood up in this particular furnace. Mention was made in the paper of the barium chloride furnace. It is very difficult to maintain the lining in that type of furnace. Can Mr. Loebell give any specific instances?

Mr. Loebell: The lining in the particular furnace that I referred to has to withstand a temperature of 2500 deg fahr. and a majority of the refractories will become conductors at that temperature, so that you would have no bottom to your furnace. If it were on a cast iron support, it would melt right down, the heat being concentrated at the bottom. We have tried practically every known refractory, and the last one we tried stood up a little better. It is all a question of the refractory. What is needed is a refractory that will stand the temperature and at the same time not become a conductor at a high temperature.

Mr. G. A. Schneider, San Francisco: I have been making steel in various ways for about 25 years. I have been making electric steel for about 12 years. I heard a great deal of talk about the quality of electric steel for ten years after it was perfectly possible to make good steel, but you could not interest a man who had a steel plant in that. You had to get at the cost with him. You can make just as good steel in an open-hearth furnace as you can in an electric furnace. You can make just as good steel in a crucible furnace as you can in an electric furnace. The best steel in the world, that made for the Krupp guns and the English guns, is made in open-hearth furnaces. The electric steel furnace did not interest people very much for ten years, until it became known that it was cheaper to make steel in the electric furnace than any other way.

To-day it is cheaper to make electric steel than any other kind. In our office we have about 500 inquiries from the American Steel Company about electric furnaces. Electric furnaces are cheaper than any other kind.

In regard to the question of 3-phase and single-phase, it is all the same in point of cheapness. Both will make good steel, but you can of course use the single-phase at about one-half the cost of the 3-phase current. The cheapest furnace is operated at about 0.5. I have been running the steel game in competition with a fuel steel furnace for about two years, and it is about 1.7. My load-factor is about 50 per cent, somewhere between 45 and 50 per cent. Running normally the 24 hours the load-factor is about 70.

Mr. Learned: They get their current for one-half cent. Is that on the peak basis?

Mr. Schneider: All furnaces are operated on the peak basis.

Mr. Learned: I would like to know also how you balance your load.

Mr. Schneider: In practically all cases the load is taken off of two of the three wires. That means that 50 per cent of the load is on one phase, and 25 per cent of the load is on each of the other two phases.

Mr. Kearns: I am very sorry that there are not a larger number of men here to take an interest in this subject. It became a really live issue in this country about 1906 or 1907, with the introduction of the Rockling-Rodenhauser type of furnace, which was put on the market about that time. Unfortunately, it has taken the steel industry seven or eight years to really appreciate the advantages for the melting of steel that can be secured from any type of electric furnace. I agree with Mr. DellPlain that it offers a great opportunity for central station people in almost every locality.

I know that the Detroit people are giving this question very careful study, and are planning to install special machines to handle the single-phase loads from their 3-phase system, as they feel that the load-factor is so high that it is very desirable business to secure for their lines.

They further recommend the taking of this load at a period that will not interfere with their peak, and in that way avoid purchasing additional generating machinery. I also know that around Niagara Falls, where perhaps more furnaces are used than in any other part of the country because of the low cost of the energy, they make special arrangements, such as to ask the people who want to use the furnaces to connect them up only during the noon hour, for which period they give them an extremely attractive rate. In the same way, on holidays and at other special times, the energy could be used very profitably in connection with electric furnaces.

I believe, from a commercial point of view that all central station companies should become actively interested because there is hardly one town of any size in the United States that cannot make use of some type of a furnace. I am sure also that after careful consideration the power companies can find a means of giving service to any type of furnace, whether single-phase, or 3-phase.

CHAIRMAN BURNETT: This subject has been most excellently handled during the past year. It is a matter of extreme regret that Mr. Russell, the active and efficient chairman, has not been able to attend this convention or the Committee and executive meetings. He has however compensated in full measure for his absence by his activity and efficient work on this Committee. I am very sure it is the wish of all concerned to see the recommendations of this Committee carried out. I would like to suggest that a motion be made to accept and print in full the report of the Committee in the transactions. That motion will now be in order.

(Motion made, seconded and carried)

CHAIRMAN BURNETT: If there is to be no further business the meeting will now adjourn.

(Adjourned)

FIFTH COMMERCIAL SESSION

Friday Morning June 11

Chairman T. I. Jones: The first business this morning will be a paper by Mr. C. H. Stevens of the Brooklyn Edison Company, on "Power Sales Methods."

POWER SALES METHODS

DEMONSTRATION OF A POWER SALE

GENERAL

The industrial power business of the central station has in recent years gone through a rapid course of evolution. A few years ago, men employed to work exclusively on the sale of electric power were unheard of, and it is only with the recent development of the business that it has been found necessary to engage men whose sole duty is to devote their entire time to this branch of the work. Naturally, when the power business and the application of motor drive began to impress themselves forcibly upon the minds of central station managers throughout the country, the men chosen for this work were technically trained in mechanics and motor application, and were associated principally in an advisory capacity, that is, the question of obtaining power business was considered at that time as a proposition in engineering rather than in salesmanship.

Likewise, papers on the power situation presented before this body at former annual conventions have usually dealt with the subject from the standpoint of the application of motors to machine tools, or to different lines of manufacture, and have scarcely given adequate consideration to the commercial phases of the situation.

We have now reached a point where the power business in some of the companies represents 50 per cent or more of the entire output of our stations. The problems to be met and solved have naturally increased with the development in size of these propositions, to a point where thousands of horse-power and many thousands of dollars in revenue are often involved, and not only do we meet with greater engineering problems, but we enter a new field where competition is encountered in its keenest form.

A few years ago, our chief competition was with the gas engine and small steam engine, but with this bigger development, we now compete directly with the performance of multiple-expansion steam engines, gas producers, oil engines, locomobiles and in some instances even with water-power, and we not only must present our figures and arguments to the owners of the enterprise, but in a majority of cases must also convince architects and consulting engineers of the merits of our service.

The purpose of this paper is to present suggestions and ideas on the proper handling of these large deals, giving due consideration to the engineering features, but emphasizing the fact that technical knowledge will be of little use in closing the contracts if the man who directly handles the work does not have the qualities which go to make up a first class salesman, or if the organization back of the salesman is not properly equipped as befitting the volume and importance of this work. In other words, if we wish to close a five-year contract with a firm that might pay us approximately $10,000 per year, we must handle the proposition not only from a technical standpoint, but in much the same way as would any industrial concern which is trying to sell $50,000 worth of their goods to one customer.

The subject of this paper is one on which much could be written, but as it is practically the first of its kind to be presented before this body, an attempt will be made to cover only a small part thereof. In order to concentrate as much as possible within the allotted time and space, a typical analysis of the handling of a proposition will be given for your consideration; starting with the lead when received, and ending with the final argument presented. No hard and fast rules will be laid down as to details of organization or salesmanship, since while the principles may remain standard they are usually affected by existing conditions. It is the purpose, however, to bring out as many points and suggestions as possible which may be of help to others in handling this work.

ORGANIZATION

It will be necessary, in order to give a proper presentation of this subject, to assume that the requisite materials are at hand with which to work, and such an equipment is herewith suggested:

As a suitable name for this important branch of the Sales Department, the title of "Power Engineering Bureau" is suggested, and its personnel may be as follows, subject to modifications governed by local conditions and the magnitude of the industrial problems which may come before it.

We will now take up briefly the duties and qualifications of the different members of this Bureau.

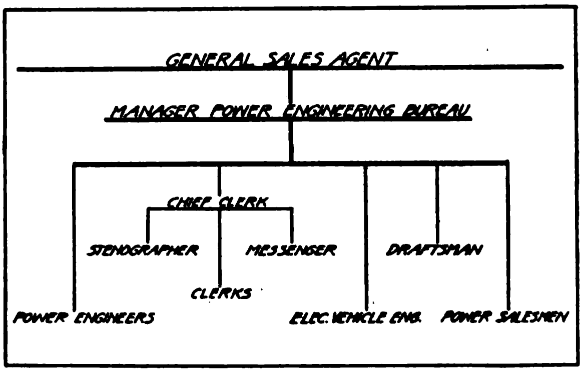


FIG I—SHOWING TYPICAL POWER SALES ORGANIZATION

Manager The manager should be directly responsible to the General Sales Agent for the entire operation of the Bureau. He should be a man of executive ability, with a thorough knowledge of the power business. He should be capable of meeting large manufacturers and business men on equal terms, keep in touch with the development of the city, know personally the largest customers of the company and be wide awake to the possibilities of his position.

Power Salesmen The duty of these men is to deal directly with the prospective customer. They should be practical men of good personality and address, with a technical training, and first, last and at all times, should be good salesmen, capable of handling large deals.

Power Engineers These men do not come in contact with the prospective customer, but are called upon to test engines, boilers, motors and other apparatus, to figure results of tests, plot curve sheets, work up engineering data, and to otherwise assist the power salesmen. They should be primarily technical men whose chief qualification should be accuracy.

Chief Clerk, Draftsmen, and Necessary Assistants The duties of this force are to look after details of the Bureau, keep a plant record, make up monthly reports, check orders, keep a follow-up system and the files containing correspondence, drawings, results of tests, and other data.

Electric Vehicle Engineer He should be a technically trained man who has had experience with storage batteries and electric vehicles; one capable of keeping pace with the industry, promoting the use of the electric vehicle and co-operating with manufacturers. The services of this man are at present confined to a limited field.

EQUIPMENT OF THE BUREAU

The equipment of the Bureau should be complete in all details, and some of the requisite appurtenances for the proper handling of the business would be:

A LIBRARY consisting of engineering books which have direct bearing on the different phases of the business;

A FILING SYSTEM containing engineering data, catalogues, results of tests, correspondence, and completed propositions;

A PLANT RECORD consisting of a complete record of all steam, gas and oil engines and private plants in the territory covered, this record to be kept on a card system, with space allowed on cards for notations of results of calls by salesmen, and forms of advertising sent out.. The geographical location of these plants should be transferred from the cards to a series of maps of the city, to be used as a better reference by both the Sales and Electrical Engineering Departments of the Company, to show where the new business developments will be, and for its proper bearing upon proposed extensions of the system;

TESTING INSTRUMENTS consisting of voltmeters, ammeters, wattmeters, engine indicators, engine counters, draft gauges, thermometers, steam meters, speed indicators, and similar devices;

A FOLLOW-UP SYSTEM, DRAFTING BOARDS AND DRAWING INSTRUMENTS.

A POWER SALE

Assuming then that we have the proper facilities with which to handle power work, we will proceed with a typical sale.

In giving this analysis, a typical instance is taken, into which as many phases of power work enter as are usually found in practical experience. Some of the statements given may seem superfluous and not of direct value to the paper itself. There may also be criticisms as to details left out. However, it must be understood that in attempting to handle this subject, the writer must necessarily draw more or less upon the imagination of the reader, and when we consider that many calls on a prospect involve several hours' conversation, it is obvious that all conversation pro and con between the salesman and the prospect cannot be included. Only the routine of a saleman in handling the job, and some of the principal points at issue will be given. Such fundamental considerations as the saleman having a clean collar, a shave, etc, and the prospect knowing that central station service is reliable, clean and odorless, will be taken for granted.

From the records of the Building Department of the City, we find that the John Doe Company, hereinafter referred to as the "Owners," located in Newark, N. J., has filed plans with the city for the erection of a seven-story building, containing approximately 210 000 square feet of floor space above the basement, to be located at the corner of .... Street and .... Avenue, Brooklyn, N. Y. The Architects are given as John Brown and Company, hereinafter referred to as the "Architects," and the cost of the building is to be approximately $500,000.

The Owners are looked up in the telephone directory, and it is found that they are manufacturers of shoes. The lead is then turned over to the Chief Clerk of the Bureau to see that the proper entry is made in the Plant Record File. A power salesman is assigned to the job, preferably a man who has had some experience working on shoe factories. The salesman calls on the Owners, in Newark, who refuse to be interviewed on the subject, except to refer him to their Architects for any information concerning the new building. The salesman then calls on the Architects who advise him that plans are not as yet completed, but that when they are, a private plant will in all probability be installed. The salesman inquires why they are considering a private plant without first looking into the merits and cost of Edison service. He is advised that the Owners have been operating a steam engine in their Newark factory for the past ten years which has always proved satisfactory, and that they have expressed their desire to continue this same method in their new factory with the addition of generators and motors.

The salesman inquires if the Architects are conversant with the rates the Edison Company is offering to manufacturers, and is told that they believe any private plant, especially a shoe factory where live steam is required to some extent, can be operated for less than the cost of purchasing power from an outside source. The salesman asks for details as to their power requirements in order that he may submit a figure, and is told the only information they can give is that their load will be approximately 600 horse-power. He states that this is not sufficient information on which to submit a figure, as it would not be fair either to the Company or to the Owners to give an approximate price until the details of the load are known.

He offers to make a test on the plant of the Owners in Newark to get their power requirements and to use this as a basis for submitting an engineering report and proposition on the complete cost of installing and operating a private plant versus operating by Edison service. The Architects reply that this will not be necessary, inasmuch as they know their present cost of operating and the initial cost of a plant, and that they are not in a position to give out any additional data at the present time, but will advise him if they decide to go into the matter further. They also tell him that their load conditions should not be of any great importance to him in submitting a figure for central station service, inasmuch as they would only give consideration to a flat rate, which would have to be made irrespective of load conditions.

The salesman goes back to the office and reports verbally to the Manager and also makes a written report which is transferred to the plant record file.

The following letter is immediately sent out to the Architects:

Messrs. John Brown & Company,
Newark, N. J.

GENTLEMEN:—Our representative reports that as a result of a call made on you under this date, he was unable to get sufficient information on the power requirements of the John Doe Company to enable us to submit you a figure for operating by Edison service.

We realize that your plans are hardly under way at the present time, and that perhaps you have not all the details of the proposed installation at hand. However, we know that you, as Architects, will recommend the most efficient and economical source of power to your client, and that to do this you must thoroughly investigate the different sources available.

We have a proposition in Brooklyn which we know will interest you if we are given a chance to present it, and the purpose of this letter is to ask you again if you will either give us additional data yourself, or grant us permission to get this information by testing out the present plant of the John Doe Company in Newark.

Will you please advise us on this matter at your earliest convenience.

Very truly yours,

GENERAL SALES AGENT.

The chief clerk of the Power Bureau obtains a special rating of the Owners from Bradstreet's or Dun's to ascertain the officers and directors of the company. An abstract of the rating which is received the next day is given as follows:

JOHN DOE COMPANY
Shoe Manufacture
NEWARK, N. J.

J. J. DOE, *President* (Cor. Blank St. & Blank Ave.)
R. C. DOE, *Vice-President*
JOSEPH F. SMITH, *Secretary*
JOSEPH T. WILLIAMS, *Treas.*
Directors—JOHN DOE, J. J. DOE, JOSEPH F. SMITH, J. T. WILLIAMS, HENRY F. SMITH AND GORDON BROWN.

This company was incorporated under the laws of the State of New Jersey in April, 1890, succeeding to the business previously conducted by John Doe. In July 1900, a second building was built and extensive improvements and alterations made in the old buildings. The property as it now stands is valued at $750,000, and is unincumbered. Since the reorganization of the company, the capital stock has been increased to $1,000,000. The volume of the business is now estimated at $2,000,000 annually. It is regarded as responsible for its purchases.

A letter is received from the Architects as follows:

Edison Electric Illuminating Company of Brooklyn,
Brooklyn, N. Y.

GENTLEMEN:—We acknowledge receipt of your letter with reference to the proposed plant of the John Doe Company in Brooklyn.

We have already advised your representative that we intend to install a private generating plant in this building, as we believe our conditions are such that we can show a greater economy in this way than by purchasing power from an outside source. However, we have no objection to your submitting us a figure, and we believe that the information which we have given should be sufficient for your calculations. Our load will be approximately 600 horse-power, and we shall operate 9½ hours per day.

If you can offer us a flat rate which we consider to be less than we can make our own current for, we will, of course, be very glad to enter into a contract with you.

Very truly yours,
JOHN BROWN & COMPANY.

The salesman immediately calls on the Architects and explains in greater detail why the Company cannot submit a flat rate on this or any other proposition, and that there is no logical reason why his Company should be handicapped in this way in giving a figure, inasmuch as the operating cost on a private plant is not a flat cost, but is entirely dependent upon the load-factor of the plant and upon the market value of coal, labor and supplies.

He then gives the Architects a list of large factories in Brooklyn being operated by central station power, with special reference to shoe factories. He again urges that he receive some data on the power requirements or be allowed to test out the Newark plant, pointing out the necessity of doing this as soon as possible, as it may very likely make a difference in the plans of the building.

He receives no encouragement from the Architects and resolves to see the Owners.

The salesman calls the Owners on the telephone and asks for an interview, saying that he has a matter to take up with them personally in regard to the new building, and makes an appointment for the following day, when he calls and explains the result of his talk with the Architects. He emphasizes to the Owners the cheap rates offered in Brooklyn for power purposes, and that he has every reason to believe he can save the Owners money in the operation of their plant. He states that he considers his Company should be given a fair chance in the competition for this business, but in order to quote a price that will be authentic, sufficient information concerning the requirements must first be obtained. He explains that if a test is made on the present plant it will involve no obligation or inconvenience on the part of the Owners, and that the report submitted will be based entirely on engineering principles. Should it be found that a private plant will prove more economical than Edison service, the report will frankly show such conclusion.

Permission is given by the Owners to test the plant and the Architects are requested by the Owners to give the Salesman such information as they can to help in making up the report.

The salesman makes a written report to the Manager, who assigns the necessary power engineers to indicate the engine and makes the necessary tests on the Owners' plant. Tests are made on plant for a period of one week when the proposition is made up as follows:

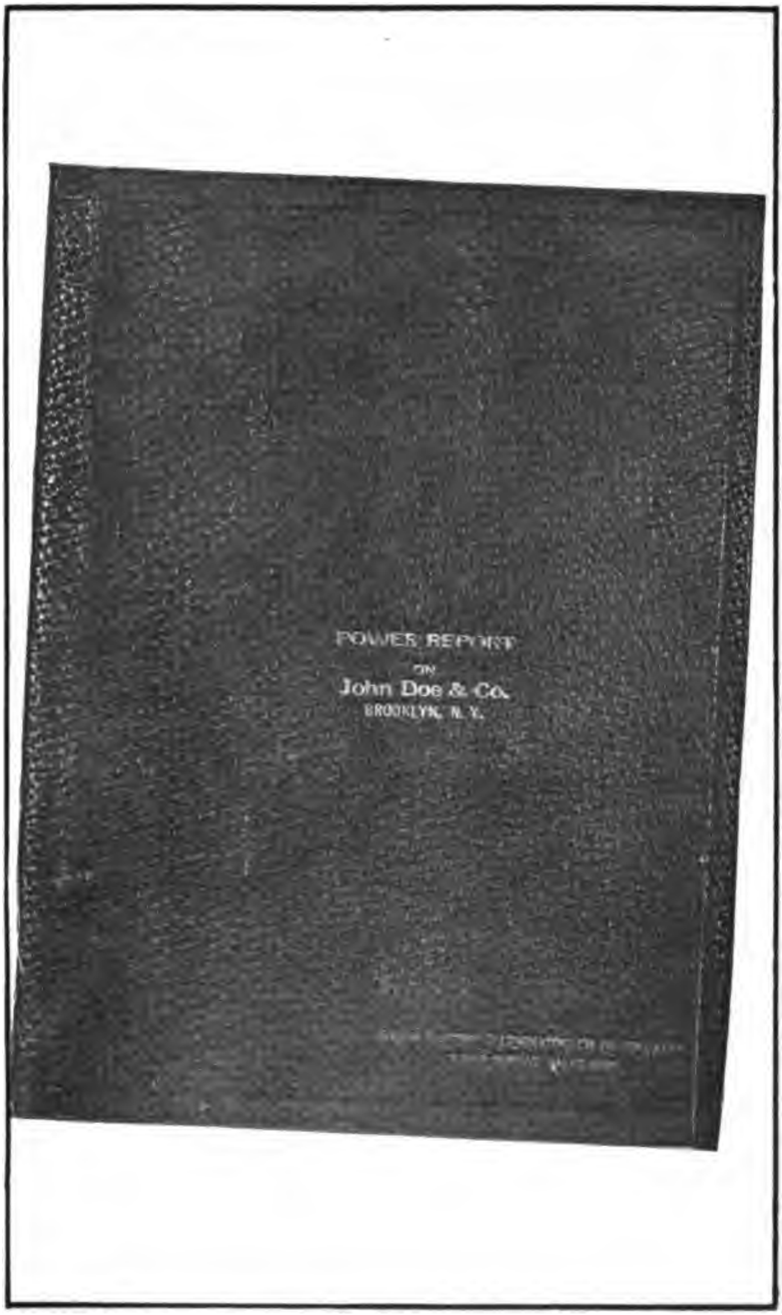


FIG 2

POWER ENGINEERING BUREAU

SALES DEPARTMENT

PROPOSITION SUBMITTED TO
JOHN DOE COMPANY, NEWARK, N. J.
ON COMPARATIVE COSTS OF OPERATING
PRIVATE PLANT VERSUS EDISON SERVICE
FOR PROPOSED BROOKLYN FACTORY

INDEX TO NET RESULTS

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Summary of Operating Costs for Private Plant - Page
Summary of Operating Costs for Edison Service - Page
Comparison of Costs - - - - - - - - - - - - - - - Page

By
EDISON ELECTRIC ILLUMINATING COMPANY
OF BROOKLYN

POWER ENGINEERING BUREAU

SALES DEPARTMENT

GENERAL:

The John Doe Company is at present engaged in the manufacture of men's shoes at the premises known as .... Street and .... Avenue, Newark, N. J.

It is now proposed to move this establishment to Brooklyn, and plans have been filed for the erection of a 7 story concrete, fire-proof building containing approximately 210,000 square feet of floor space, to be located on the southeast corner of ....Street and .... Street.

It is proposed to use electric lighting throughout the new building and all power to be supplied by electric motors using group drive. The method of obtaining this power, whether from a private generating plant to be located in the premises, or by purchasing it from the Edison Electric Illuminating Company of Brooklyn, is now under consideration by this concern.

POWER ENGINEERING BUREAU

SALES DEPARTMENT

PURPOSE:

It is the purpose of this proposition to submit an estimate on the cost of operating a private plant for the entire supply of light, power and heat to these premises and also an estimate for supplying this same amount of light, power and heat by what will hereinafter be referred to as the Edison System.

BASIS:

The basis for all figures submitted herein is given as follows:

First: Figures on proposed plant equipment and specifications of building submitted Mr. John Brown and Company, Architects.

Second: Figures on boiler evaporation, engine performance, and general plant operation in proposed building are based on engineering experience and tests made on industrial plants similar to the proposed plant.

Third: Figures on the yearly kilowatt hour consumption and maximum demand are based on the results of indicator tests run on the John Doe Company's present steam plant, Newark, N. J.

Fourth: Cost of current used under Edison System is based on regular form of Rate "B" Contract, copy of which is embodied in this proposition.

Rate "B"
Low Tension Contract

AGREEMENT FOR ELECTRIC SERVICE

To Edison Electric Illuminating Co. of Brooklyn:

Brooklyn, N. Y.________________191__

You are hereby requested and authorized to connect your mains with, and supply Electric Current to an equipment of about 700 H.P. in motors and lights requiring approximately 350 kilowatts of electrical energy for its complete supply, its exact capacity to be rated as determined and scheduled by your inspector, installed upon premises No.______ St. and ______ St. Borough of Brooklyn, City of New York, occupied as a shoe factory and we, our executors, administrators, successors or assigns, agree to use (subject to the Terms and Conditions endorsed hereon, which are hereby made a part of this agreement), Electric Current supplied by your Company for the said equipment, for a term of five years from the commencement of supply, and further agree to pay, on presentation of bill, for said Electric Current used during each month or shorter period, as measured at and by the meter or meters provided by the Company, as follows:

Rate

Demand Charge

The Customer guarantees that his Maximum Demand in any month shall not be less than 130 kilowatts, and for each month during the life hereof the customer agrees to pay the Company demand charges in accordance with the following schedule:

$2.40 per kilowatt per month for the first 50 kilowatts of the Customer's Maximum Demand and
$2.00 per kilowatt per month for excess of the Customer's Maximum Demand over 50 kilowatts.

Energy Charge

In addition to the demand charge above noted for any month, the Customer also agrees to pay to the Company an energy charge each month, based on the number of kilowatt hours consumed in such month, according to the following schedule:

5 cents per kilowatt hour for the first 1,000 kilowatt hours of consumption in the month;
3 cents per kilowatt hour for the next 4,000 kilowatt hours of consumption in the month;
1.3 cents per kilowatt hour for the next 50,000 kilowatt hours of consumption in the month;
1 cent per kilowatt hour for the excess consumption in the month over 55,000 kilowatt hours.

Determination of Maximum Demand

The Customer's maximum demand will be determined by integrating maximum demand instruments installed by the Company.

Prompt Payment Discount

As soon as practicable after the end of each month, the Company shall render a bill to the Customer for the amount due hereunder, for such month, and the Customer agrees to pay each bill within 10 days after date of the bill, and if such bill be paid within such 10 days the Customer shall be entitled to a discount from the amount of the bill, equal to 10% of the total amount of the energy charges only.

Terms and Conditions of Service

It is agreed that the motors to be installed under this agreement shall be of a type approved by the Company, otherwise the Company shall have the right to discontinue its service at any time upon thirty days' written notice to the Customer.

It is agreed that no other electric power or lighting service shall be used in conjunction with the Company's service, either by means of a "throw over" switch or by any other connection, without the express written consent of the Company specially obtained for the purpose, and any violation of this rule shall authorize the Company to discontinue its service entirely.

It is agreed that at the expiration of the stated term, this agreement shall continue in force until terminated by thirty days' written notice from either party.

This agreement shall not be binding upon the Company until accepted by it through its proper executive officer, and shall not be modified or affected by any promise, agreement or representation by any agent or employe of the Company unless incorporated in writing, into this agreement before such acceptance.

____
(Sign full name here)

Submitted by________________

____
____
(Billing Address)

Accepted the________________day of____________191__

Edison Electric Illuminating Company of Brooklyn

Approved:
____
General Sales Agent

By
____
Secretary

POWER ENGINEERING BUREAU

SALES DEPARTMENT

REPORT OF TESTS

MADE ON

PRESENT STEAM PLANT

NEWARK, N. J.

GENERAL DESCRIPTION OF PRESENT STEAM PLANT, NEWARK, N. J.

Boilers:

3 - 200 H.P. fire tubular boilers operated at a steam pressure of 100 pounds gauge.

Engines:

1 - Tandem compound non-condensing corliss engine, 22" and 42" x 48", 70 R.P.M. This engine supplies the entire lighting and power requirements, mechanical drive being used throughout the plant.

Pumps:

2 -	Boiler Feed Pumps	- 8" x 5" x 10"
1 -	House Pump	- 7-1/2" x 4-1/2" x 10"
1 -	Sump Pump	- 5" x 4" x 7"
1 -	Fire Pump	- 16" x 9" x 12"

Generator:

1 - 50 kilowatt, 230 volt, three wire generator, belted to main shaft. Used for supplying light through the building.

RESULTS OF TESTS:

Indicator test made on the present steam engine during the week of February 1st to 8th, 1915, at which time the plant was being operated under normal conditions. Curve sheets submitted, shown as Figure #3 and Figure #4, represent the instantaneous readings of indicator test taken at 15 minute intervals throughout three typical working days.

PRESENT POWER OUTPUT:

The results of tests show an average load on the engine of 410.9 I.H.P. The average friction load represented 260 H.P. or 63% of the total power input to the steam engine. From a careful investigation of the main drives and shafting throughout the building, it is estimated that operating with an electrical equipment, this friction load would be reduced to not more than 195 H.P.; this would result in a revised load on the plant of 345.9 electrical H.P., which, operated for 53 working hours in the week, would mean a total current consumption of 13,676 kilowatt hours.

It should be noted that this amount of power includes the necessary lighting load which is in use but half the year. The lighting load as found on the days of indicator test equals 395 kilowatt hours per week. This amount would not be used during the Summer weeks, and in order to get a fair average during the Winter and Summer, 395 kilowatt hours must be subtracted from 13,676, which is equal to 13,281 kilowatt hours. This would give an average of 13,478 kilowatt hours per week during the entire year.

The records of the company show that 15,000 pairs of shoes were made during the week when test was made, and with a current consumption of 13,478 kilowatt hours, the average kilowatt hours per pair of shoes would equal .898 kilowatt hours. During the previous year 700,000 pairs of shoes were manufactured which, based upon the above calculations, would equal a yearly consumption of 628,600 kilowatt hours under Central Station service.

The maximum demand for one half hour on plant as derived from indicator test, shows 466 I.H.P. including lighting. It is estimated that operation on electrical drive this would be reduced to not more than 401 H.P., owing to the elimination of friction and the diversity factor in starting and operating motor driven machiner. 401 H.P. or 299.1 kilowatts is assumed as demand during the Winter months. 383.6 H.P. and 286.1 kilowatts the demand during the Summer months. This would give an average monthly maximum demand of 292.6 kilowatts.

POWER ENGINEERING BUREAU

SALES DEPARTMENT

RESULTS OF TEST

Daily Loads
Week of February 1st to 8th, 1915.

(See Fig.3)

Date	Avg. I.H.P.	Max. I.H.P.	Avg. Friction Load	Avg.Mech. Load	Max. Mech. Load	Avg. Elec. Load	Max. Elec. Load
Monday	428.4	463.3	260	397.2	448.6	31.2	43.6
Wednesday	442.4	466.0	260	411.2	447.3	31.2	43.6
Saturday	353.7	382.6	260	337.4	373.3	16.3	19.6

Weekly Composite Results of
Present Mechanical Load and
Equivalent Electric Load in
Present Factory

(See Fig.4).

	MECHANICAL LOAD			EQUIVALENT ELECTRICAL LOAD		
	Avg. I.H.P.	Maximum I.H.P.	Avg. Friction Load	Avg. H.P.	Maximum H.P.	Avg. Friction Load
Winter	410.9	466.	260	345.9	401	195
Summer	399.9	448.6	260	334.9	383.6	195
Average	405.4	457.3	260	340.4	392.3	195

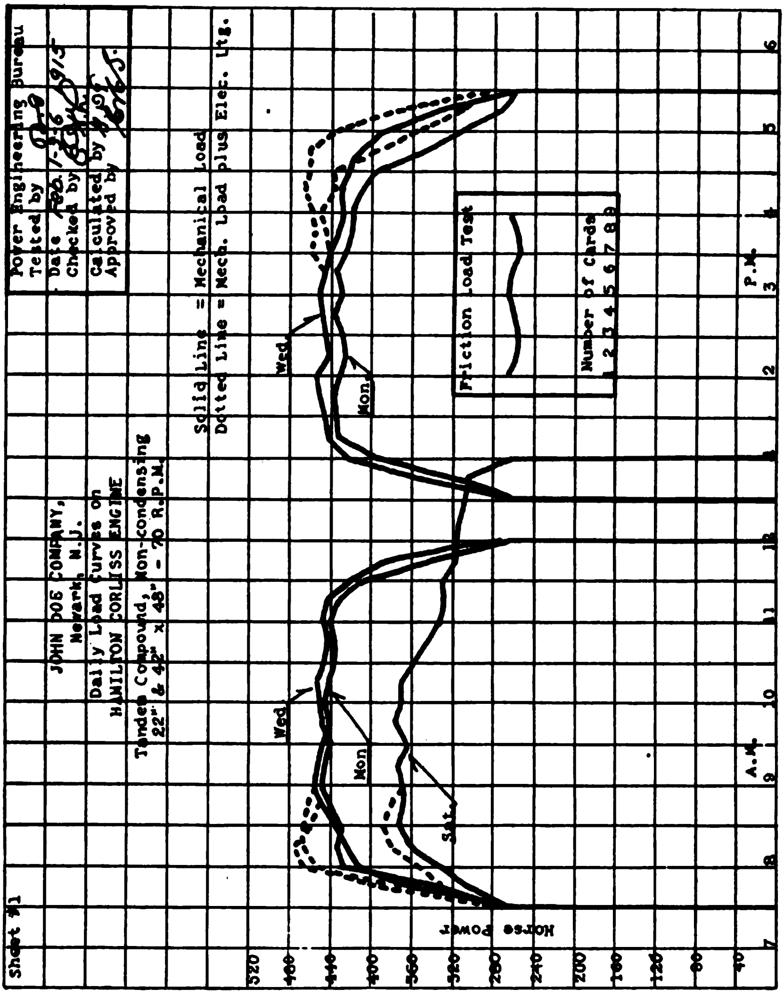

Power Engineering Bureau
Tested by
Date Feb. 7-16 1915
Checked by
Calculated by
Approved by
JOHN DOE COMPANY,
Newark, N.J.
Daily Load Curves on
HAMILTON CORLISS ENGINE
Tandem Compound, Non-condensing
22" & 42" x 48" - 70 R.P.M.
Solid Line = Mechanical Load
Dotted Line = Mech. Load plus Elec. Ltg.
Friction Load Test
Number of Cards
1 2 3 4 5 6 7 8 9
Sheet #1
Horse Power
520
480
440
400
360
320
280
240
200
160
120
80
40
7
8
9
A.M.
10
11
12
1
2
3
P.M.
4
5
6
Wed.
Mon.
Wed.
Mon
Sat.

FIG 3

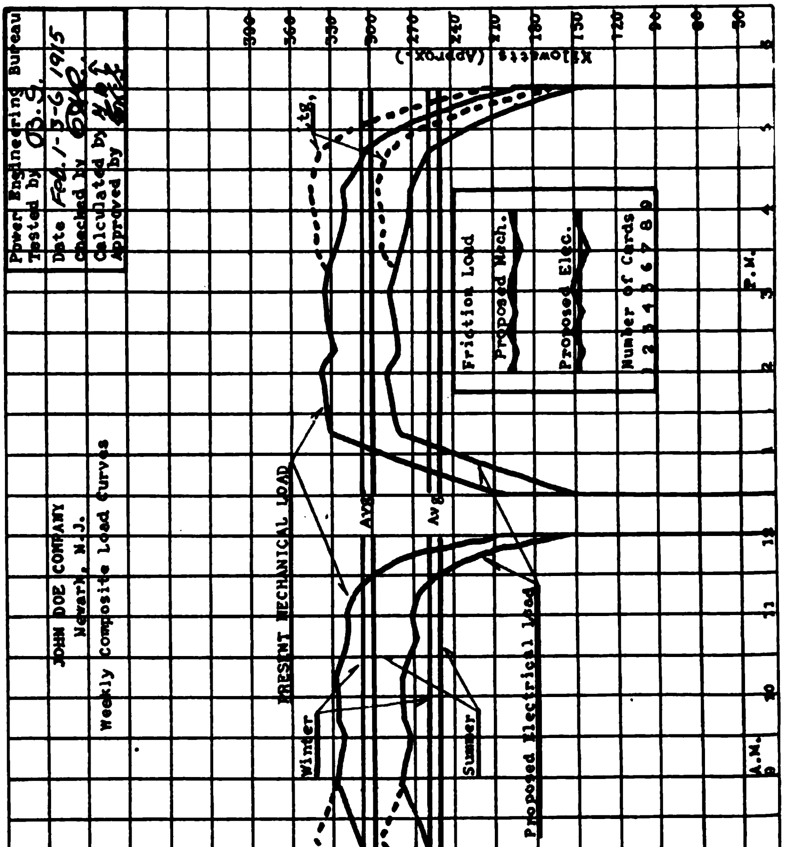

Sheet #2
JOHN DOE COMPANY
Newark, N.J.
Weekly Composite Load Curves
Power Engineering Bureau
Tested by B.S.
Date Feb. 1-3-6 1915
Checked by
Calculated by
Approved by
PRESENT MECHANICAL LOAD
Winter
Summer
Ltg.
Ltg.
Avg
Avg
Proposed Electrical Load
Friction Load
Proposed Mech.
Proposed Elec.
Number of Cards
1 2 3 4 5 6 7 8 9
Horse Power
Kilowatts (Approx.)
520
480
440
400
360
320
280
240
200
160
120
80
40
390
360
330
300
270
240
210
180
150
120
90
60
30
A.M.
P.M.
7
8
9
10
11
12
1
2
3
4
5
6

Fig 4

ELECTRICAL LOAD ON PROPOSED PLANT AT BROOKLYN, N. Y.

The capacity of the proposed factory is to be 800,000 pairs of shoes per annum. Figuring on the basis given of .898 kilowatt hours per pair of shoes, the yearly current consumption for the above number of pairs of shoes would equal 718,400 kilowatt hours. Likewise, the maximum demand during the winter months would average 341.8 kilowatts and during the summer months 326.9 kilowatts, which would represent an average monthly maximum demand of 334.3 kilo watts.

POWER ENGINEERING BUREAU

SALES DEPARTMENT

ESTIMATED

COST OF PRODUCING POWER

BY

PRIVATE PLANT

IN

PROPOSED BROOKLYN FACTORY

POWER ENGINEERING BUREAU
SALES DEPARTMENT

ESTIMATED COST OF PRODUCING LIGHT, HEAT & POWER BY PRIVATE GENERATING PLANT:

BASIS:

The following estimate on the cost of operating independent generating plant, is based upon the installation of the following equipment which is at present under consideration by the John Doe Company.

PLANT EQUIPMENT:

Boilers:

2 - 250 H.P. tubular boilers
1 - 200 H.P. tubular boiler
(To operate at a pressure of 120 lbs. gauge)

Pumps:

2 - Boiler Feed Pumps	- 8" x 5" x 10"
1 - House Pump	- 7-1/2" x 4-1/2" x 10"
1 - Sump Pump	- 5" x 4" x 7"
1 - Fire Pump	- 16" x 9" x 12"

Engines & Generators:

2 - 200 kilowatt, D.C., 230 volt generators direct connected to 2 tandem compound non-condensing engines.

1 - 150 kilowatt, D.C., 230 volt generator direct connected to 1 tandem compound non-condensing engine; engines to exhaust into heating system.

Switchboard:

3 - Generator panels.
8 - Power distributing panels
1 - Lighting distributing panel

COST OF PLANT EQUIPMENT:

The cost of this installation including foundations and smoke stack, is estimated at - - - $50,000.00

FIXED CHARGES:

Interest:

Capital invested in plant apparatus should bear interest charges. If these charges are accounted for from year to year, at the end of the plant's operation, the owner has protected his income against loss. As 5% represents a fair rate of interest, this amount will be used in this proposition.

5% of $50,000.00 - - - - - - - - - - - - $ 2,500.00

Depreciation & Obsolescence:

The life of the plant is determined not so much by when it becomes physically useless as when it becomes obsolete, at which time it should be replaced by a more effective and economical source of power. Therefore, not only depreciation but obsolescence, should be considered, and a conservative figure to include both items would be 10% of the investment.

10% of $50,000.00 - - - - - - - - - - - - $ 5,000.00

FIXED CHARGES: (Cont'd)

Taxes & Insurance:

This item includes fire, boiler and liability insurance.

2-1/2% of $50,000.00 - - - - - - - - - - $1,250.00

(Figured on basis of rate of taxation
for Brooklyn for the year 1915)

OPERATING COST:

Labor:

From figures submitted by the John Doe Company.

1 -	Chief Engineer	at	$1500.	$6,580.00
1 -	Day Engineer	"	1200.	
1 -	Night Engineer	"	1000.	
2 -	Firemen	"	1680.	
1 -	Electrician	"	1200.	

Repairs & Renewals:

Under this item is included repairs and upkeep of boilers, pumps, feed water heaters, engines and generators. 2% of cost of equipment is considered a conservative figure for this item:

2% of $50,000.00 - - - - - - - - - - - - $1,000.00

Sundries:

This item includes oil, waste, packing, miscellaneous supplies and incidentals -

Estimated per year - - - - - - - - - - - $1,000.00

POWER ENGINEERING BUREAU

SALES DEPARTMENT

OPERATING COST: (Cont'd.)

Fuel:

Engines:

Figured on an average boiler evaporation of 8 pounds of water per pound of coal using bituminous coal bought under a guarantee of 14,000 B.T.U. per pound, and an average daily engine performance of 27 lbs. of steam per indicated H.P., a mechanical efficiency of 90%, a generator efficiency of 90% and a transmission efficiency of 98% to switchboard, and assuming a yearly consumption of 718,400 kilowatt hours at the switchboard, the coal consumption would equal - - - - - - - - - 1,828 tons

Heating:

Heating of building at night in winter, banking fires and heating engine cylinders over night in summer and for furnishing steam for auxiliaries - - - - - - - - - - - - - - 370 "

Live Steam:

Live steam for glue pots and other manufacturing purposes, figured on a basis of 40 H.P. for 3,000 hours per year - - - - - - 200 "

Total Coal Consumption - - - 2,398 tons

2,398 tons of #1 Buckwheat at $3.80
per ton delivered at premises - $9,112.40

Monthly charge for coal analysis,
standard rate $15.00 - - - - - - $180.00

OPERATING COST: (Cont'd.)

Ash Removal:

Estimated per year - - - - - - - - - - - - $ 479.60

Water:

Per year - - - - - - - - - - - - - - - - - - 479.60
(Figured on a basis of 20¢ per ton of coal fired)

Rental Value of Floor Space:

Figured on a basis of floor space 75' x 100' = 7500 square feet at 20¢ per square foot - - - - - - - - - - - - - - - 1,500.00

(Standard price per square foot of floor space in modern concrete buildings in Brooklyn today is 30¢ - allowance of 10¢ per square foot is made in this instance as space would be in basement)

Executive Attention:

In addition to the labor charges, the production of power makes frequent demands upon the time of the executive members of the company, while there is a steady demand upon the time of the bookkeepers and the purchasing department. The elimination of the private plant may not reduce the salaries of these men, but they will be more valuable in their other duties, and this time should be charged to the production of power. As a conservative figure it is estimated that this item would amount to, per year - - - - - - - $1,000.00

OPERATING COST: (Cont'd)

Breakdown Connection:

For night lighting and overtime work it would be more economical to operate from Edison Service than to run one of the large units. It is estimated that 20 kilowatts would be required for this service for which the guarantee per year would be - $600.00

POWER ENGINEERING BUREAU

SALES DEPARTMENT

SUMMARY OF OPERATING COSTS

BY PRIVATE PLANT

FIXED CHARGES:

Interest	$ 2,500.00
Depreciation	5,000.00
Taxes & Insurance	1,250.00

OPERATING COSTS:

Labor	6,580.00
Repairs & Renewals	1,000.00
Sundries	1,000.00
Coal	9,112.40
Coal Analysis	180.00
Ash Removal	479.60
Water	479.60
Rental Value of Floor Space	1,500.00
Executive Attention	1,000.00
Breakdown Connection	600.00
Total	$30,681.60

POWER ENGINEERING BUREAU
SALES DEPARTMENT

ESTIMATED COST OF OPERATING
BY
THE EDISON SYSTEM
IN
PROPOSED BROOKLYN FACTORY

POWER ENGINEERING BUREAU

SALES DEPARTMENT

ESTIMATED COST OF PRODUCING LIGHT, HEAT & POWER BY THE EDISON SYSTEM:

BASIS:

The following estimate is based on obtaining all the current for the operation of the power and lighting requirements from the mains of the Edison Electric Illuminating Company of Brooklyn and all steam necessary for the heating of the building and for use in manufacturing from a boiler plant operating at from 75 to 85 lbs. pressure.

PLANT EQUIPMENT:

Boilers:

2 - 100 H.P. tubular boilers

Pumps:

1 - Boiler Feed Pump
1 - House (Elec) Pump
1 - Sump " "
1 - Fire " "

Piping and stack

Estimated cost of the above equipment - - - - - $7,000.00

FIXED CHARGES:

Interest:

5% on $7,000.00 - - - - - - - - - - - - - - 350.00

Depreciation:

10% on $7,000.00 - - - - - - - - - - - - - 700.00

Taxes & Insurance:

(Ins. boiler,liability and fire insurance)

2-1/2% on $7,000.00 - - - - - - - - - - - 175.00

POWER ENGINEERING BUREAU

SALES DEPARTMENT

OPERATING COSTS:

Repairs & Renewals:

2% on $7,000.00 - - - - - - - - - - - - $ 140.00

Sundries:

Estimated at - - - - - - - - - - - - - 75.00

Labor:

1 - 3rd Class Engineer or
Licensed Fireman at - - $ 840.00

1 - Electrician at - - - - 1200.00

Total - - - - $ 2,040.00

Fuel:

Heating:

Figured on a basis of 165 days per heating season - - - - - - - - - - - 990 tons per year.

(This estimate is taken from comparative figures on actual amount of coal used for heating concrete buildings of like size in Brooklyn.)

Live Steam for Glue Pots & Mfg.

Tons of coal - - - 220 tons per year.

Total - 1.190 tons @ $3.80 per ton - - - - - - - - $ 4,522.00

Water:

Estimated at 20¢ per ton of coal - - - 238.00

Ash Removal:

Estimated at 20¢ per ton of coal - - - 238.00

Floor Rental:

Figured on a basis of space 20' x 36' equals 720 square feet at 20¢ per square foot - $ 144.00

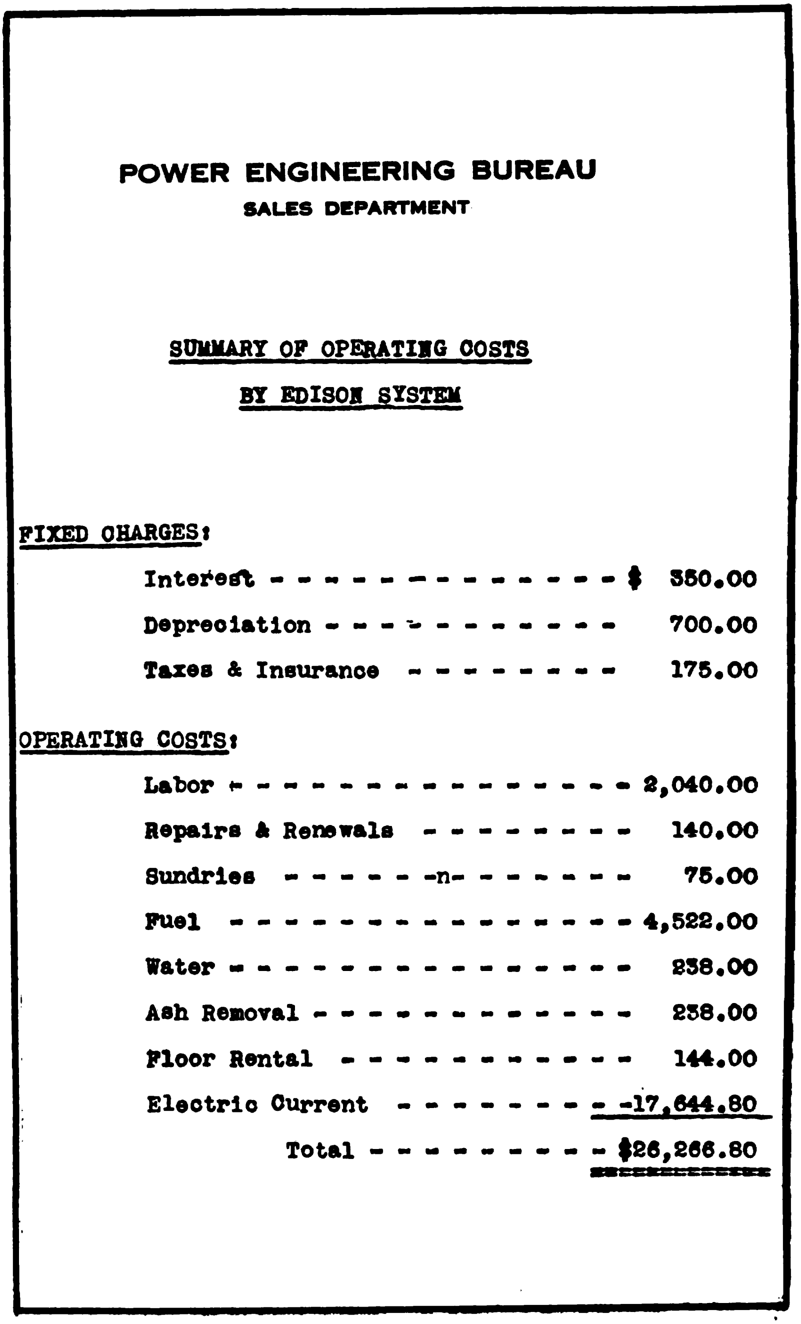
OPERATING COST: (Cont'd.)

Electric Current:

The maximum demand on the above equipment based on results derived from indicator tests made on the present plant in Newark, N. J., would average 334.3 kilowatts per month.

The kilowatt hour consumption as previously noted in this proposition will total 718,400 kilowatt hours per year.

Operating under standard form of Rate "B" Contract, assuming an average maximum demand of 334.3 kilowatts and a yearly consumption of 718,400 kilowatt hours, the cost for current would be - - - - - -$17,644.80



POWER ENGINEERING BUREAU

SALES DEPARTMENT

SUMMARY OF OPERATING COSTS

BY EDISON SYSTEM

FIXED CHARGES:

Interest	$ 350.00
Depreciation	700.00
Taxes & Insurance	175.00

OPERATING COSTS:

Labor	2,040.00
Repairs & Renewals	140.00
Sundries	75.00
Fuel	4,522.00
Water	238.00
Ash Removal	238.00
Floor Rental	144.00
Electric Current	17,644.80
Total	$26,266.80

POWER ENGINEERING BUREAU
SALES DEPARTMENT

COMPARISON OF YEARLY OPERATING COSTS

Private Plant	$30,681.60
Edison System	26,266.80
Saving	$ 4,414.80

Saving in favor of Edison System, approximately - 16.8%

POWER ENGINEERING BUREAU

SALES DEPARTMENT

GENERAL COMPARISON
OF THE
METHODS OF FURNISHING POWER
TO THE
BROOKLYN FACTORY
OF
JOHN DOE COMPANY
AS HEREIN ESTIMATED

-oOo-

SUMMARY

COMPARISON

Under the item of Fixed Charges as given herein, interest on the investment is given as 5%. However, it is reasonable to suppose that in a business of this sort, the earning value of capital would be greater than the 5% given. Therefore, there should be another item added to the cost of operating the private plant, which would be called "fair profit", the amount of this item depending upon the earning power of capital over 5% when invested directly in the business.

Under the item of Fuel for Heating, allowance has not been made for coal for day heating of building. While it is proposed to heat the building by exhaust steam from the engines, this will raise the back pressure on the engines and therefore require an additional coal consumption.

On the Rental Value of Floor Space, the amount of $1500.00 is a conservative figure of the renting value of this amount of floor space in Brooklyn today. Although this space might not be used at the present time, it should be charged at its value against the plant operating costs, in view of what it could be rented for to outside parties, or its future value to the business.

There are also the fixed charges on the cost of creating this space, which might very well be charged against the cost of operating the private plant.

Guarantees on engine performance by manufacturers are usually based on test conditions requiring a certain steam pressure on boilers, a certain load on engines, and a certain back pressure. While these conditions are sometimes possible, they are not found in every day practice in industrial plants, and in this instance, the heating of buildings by exhaust steam as referred to above, should have a definite bearing on such guarantees, if a private plant be considered.

Although provision has been made for a breakdown service for 20 kilowatts in the figures submitted on private plant operation, this amount of power would only take care of a small amount of load in case one or more departments found it necessary to work overtime, and it would then be necessary to run one of the large units at a very inefficient load, which would increase the cost per kilowatt hour.

Continuity of service is a most important item, and while in the proposed layout of the private plant allowance is made for a reserve unit, it would not be protected against shutdown in case of boilers or main steam lines. The responsibility of the plant would rest to a great extent upon one engineer and in case of sickness or accident to him, or unreliability upon his part, the plant would be practically unprotected and liable to shutdown.

The entire operating costs would be dependent upon the market price of coal, labor and supplies, and the cost of these items is steadily increasing.

Under the proposed system, the operating costs would be practically guaranteed against any increase by the terms of the contract, and as rates for current under this system are steadily decreasing, it is reasonable to suppose that there will be a still further reduction in the cost of this item.

Current would be supplied for the total capacity of the plant for twenty-four hours each day, and current for over-time work for any or all departments could be obtained by the throwing ~~it~~ in of a switch, and any such current used would reduce the price paid per kilowatt hour for the entire consumption.

Continuity of service would be practically insured as this system is amply protected against shutdowns by duplicate units, sub-stations, storage batteries and reserve power.

POWER ENGINEERING BUREAU
SALES DEPARTMENT

Ample overload capacity would be provided at all times, and additional power could be obtained by simply adding other motors or lights and throwing in the switch, and any increase in power consumed with the demand in the same proportion would mean a decreased cost in the price per kilowatt hour.

A steady voltage regulation would be assured, which would mean a constant speed on the machines and therefore a constant output.

A decreased hazard would be carried by the elimination of high pressure steam and fly wheels, and all noise, heat, vibration, dirt, smoke, and other disagreeable features attendant with a private plant, would be eliminated.

A better power would be obtained at a price below the cost of making it by private means and the responsibility of the lighting and power problem would be carried by the Edison Electric Illuminating Company of Brooklyn.

POWER ENGINEERING BUREAU
SALES DEPARTMENT

GENERAL SUMMARY

The estimate as given herein shows a decided saving in favor of the Edison System over the cost of plant operation.

This proposition has been carefully checked by our engineers and it is believed to be conservative in every way. All figures showing how different amounts were arrived at are on file in this office and will be gladly shown upon request.

Respectfully submitted,

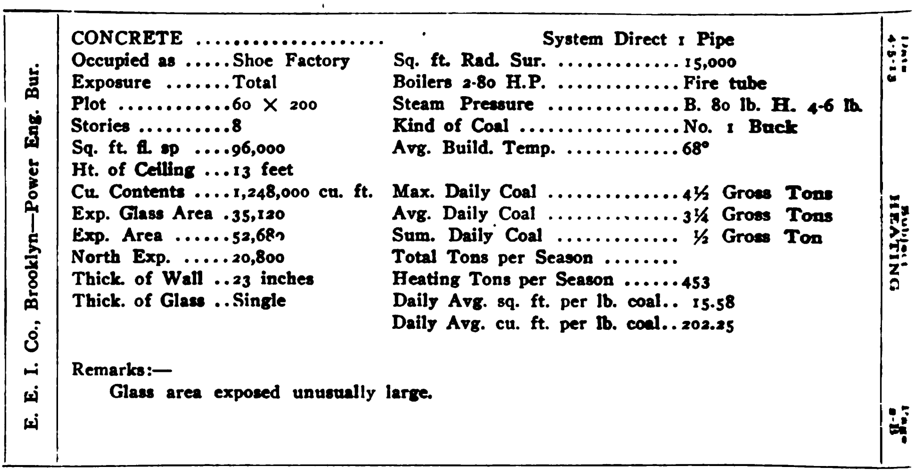
Manager, Power Engineering Bureau

Power Engineer

Approved
General Sales Agent.

This proposition is presented to the Owners in person and a copy given to the Architects. The owners do not comment on the proposition except to say that they will go over it in detail with their Architects. The salesman asks when he may call again, and is told that the Owners will give him their opinion within a week.

The salesman calls shortly on the Owners and is advised that they do not consider the proposition favorably. Upon inquiry it is ascertained that one of their principal objections is the amount of coal given in the proposition as necessary to heat the building on the Edison system. The Owners believe this amount to be insufficient and consider that at least 50 per cent more would be necessary. The salesman then presents heating data (See Fig 5) taken from actual operating conditions in a shoe factory in Brooklyn. He then shows that on the same basis of figuring, using the increased floor area in the new plant of the Owners, the tons of coal for heating would be as given in the proposition.



E. E. I. Co., Brooklyn—Power Eng. Bur.

Date 4-5-13

Subject HEATING

Page 8-B

CONCRETE		System	Direct 1 Pipe
Occupied as	Shoe Factory	Sq. ft. Rad. Sur.	15,000
Exposure	Total	Boilers 2-80 H.P.	Fire tube
Plot	60 × 200	Steam Pressure	B. 80 lb. H. 4-6 lb.
Stories	8	Kind of Coal	No. 1 Buck
Sq. ft. fl. sp	96,000	Avg. Build. Temp.	68°
Ht. of Ceiling	13 feet		
Cu. Contents	1,248,000 cu. ft.	Max. Daily Coal	4½ Gross Tons
Exp. Glass Area	35,120	Avg. Daily Coal	3¼ Gross Tons
Exp. Area	52,680	Sum. Daily Coal	½ Gross Ton
North Exp.	20,800	Total Tons per Season	
Thick. of Wall	23 inches	Heating Tons per Season	453
Thick. of Glass	Single	Daily Avg. sq. ft. per lb. coal	15.58
		Daily Avg. cu. ft. per lb. coal	202.25

Remarks:—
Glass area exposed unusually large.

Fig 5—(Facsimile of Power Engineering Bureau Heating Data Sheet)

The Owners also claim that the amount of coal given in the proposition for heating the building would, if a private plant were installed, be entirely eliminated by using exhaust steam from the engine. As against this argument, the salesman presents the curve sheet, shown as Fig 6, which shows the effect on steam consumption on an engine from back pressure caused by the heating system.

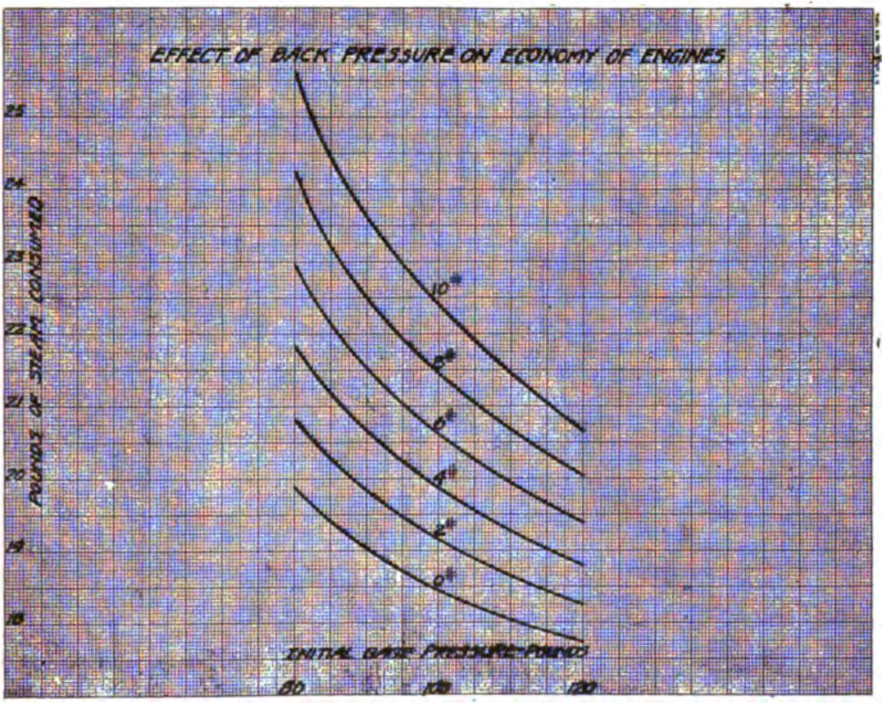


Fig 6—Showing Theoretical Steam Consumption of Engine as Affected by Back Pressure

The Owners do not commit themselves further, except to say there are several other figures in the proposition to which they take exception, and that they must have more time in which to consider it.

The Owners then call in salesmen of engines and plant apparatus, who, although each is interested in selling his particular make of engine or his particular type of apparatus, are for obvious reasons united in the opinion that the private plant will prove more economical than Edison service. These salesmen give as the steam consumption of engines a much lower figure than that stated in the proposition and also claim better evaporation of the boilers, all of which would show much less coal consumption than that given, and would make a decided difference in the total figures.

The salesman calls again, and when told of the figures submitted by the plant salesmen, explains that guarantees on boiler evaporation and engine performance have no material bearing upon the performance of the plant in everyday operation. He shows that the guaranteed performance is based on ideal conditions, but that the method of firing, back pressure on the engine caused by the heating loads, wet steam at the engine throttle, and light loads on the engines are items which will bring the steam consumption and boiler evaporation equal to at least the figures given in his proposition. He partially convinces the Owners that he is right but receives no definite answer at that time.

The engine salesmen are again on the job, and partially swing the Owners' opinion in their direction.

The salesman again calls on the Owners who advise him that as their decision on the proposition hinges principally upon several technical points, they have decided to call in a consulting engineer, namely John Blank, hereinafter referred to as the "Consulting Engineer," and that he is to submit a report on both propositions, and that they will in all probability be governed by his recommendation. The salesman is referred to the Consulting Engineer for any further information.

The salesman calls on the Consulting Engineer who advises him that he is looking into the matter but is not ready at the present time to make a report. He asks a few minor questions in regard to the proposition, but refuses to express his opinion, and finally tells the salesman that it will not be necessary for him to call again, as he will send in his report within the next few days.

The standing of the Consulting Engineer is then looked up, and it is found that on every proposition of any size which he has handled, he has advised the installation of a private plant. It is also found that this particular engineer is retained by the Owners on the basis of 5 per cent of the installation, and that in most instances he has recommended one particular make of motors, generators and engines.

The salesman again calls on the Consulting Engineer, who tells him that he is completing a report in favor of a private plant which is to be submitted the following day. The salesman inquires as to the points in the Edison proposition with which the Consulting Engineer does not agree and after much discussion they go over these points together. The principal items are the questions of engine performance and boiler evaporation on a private plant, and the coal necessary to heat the building under the Edison proposition. The Consulting Engineer also takes exception to the items under *"Fixed Charges,"* claiming that they are high; he also considers that the items *"Executive Attention"* and *"Rental Value of Floor Space"* should be eliminated entirely. After much argument the salesman decides that the Consulting Engineer is prejudiced and that it will be useless to go over these points in further detail with him.

The salesman then calls on the Owners and tells them the result of his interview with the Consulting Engineer and asks that, if an adverse report is submitted, he be given permission to go over the points at issue with the Owners. He states that he believes this to be a reasonable request in view of the work which he has put in on the proposition. The Owners advise the salesman that they have hired a consulting engineer to submit an unprejudiced report, and as they themselves are not technical men they must be governed by this report instead of by the representatives of a firm that is anxious to sell them a supply of power. The salesman advances the argument that the Consulting Engineer may be prejudiced inasmuch as he is retained on a commission basis, while the Edison report cannot be prejudiced for the reason that the Company is selling a service, and that service must be satisfactory, year-in and year-out, in order that the contract be advantageous to both parties concerned. He explains that at the present time there is simply a difference of opinion between the Consulting Engineer and the Edison Company, and that there is reasonable chance for either report to be wrong to some extent. However, if the report of the Consulting Engineer be accepted, it means that the Owners must spend approximately $50,000 for the installation of a plant, whereas, the Edison proposition eliminates this initial expenditure. In other words, the Owners must spend $50,000 before they can prove the Consulting Engineer's report, but they may install Edison service without this first cost, and after giving it a fair trial, if the results should not be satisfactory they may then install their plant as originally intended.

The salesman points out that the entire proposition is dependent upon a very few items upon which there is a slight diversity of opinion, and suggests that a fair way of settling the matter would be to hold a meeting in the office of the Owners at which the Consulting Engineer and himself would be present. At this meeting these points could be threshed out and as a result the Owners definitely decide upon which system to install. The Owners agree to hold this meeting after they have received the report from the Consulting Engineer, saying that they will notify the salesman in due time.

The Consulting Engineer submits a report in favor of a private plant. The Owners telephone to the salesman that the report has been received and the meeting will be held in their office the following day. The meeting is called at which are present the President, Secretary and General Superintendent of the Owners, the Consulting Engineer and the Edison salesman.

The Owners state that the meeting is called for the purpose of determining the method of obtaining the power to be used in their new Brooklyn factory, and that unless the salesman shows a good reason why Edison service should be installed, they will abide by the report of their Consulting Engineer and install a private generating plant.

The salesman then asks that the Consulting Engineer please state the items in the Edison proposition with which he does not agree, and give his reason in each instance for the objection. The Consulting Engineer, taking the items according to the sequence in which they appear in the proposition, takes issue with the following points:

UNDER PRIVATE PLANT OPERATION

Cost of Plant Equipment The item of $50,000 representing the cost of initial installation is considered excessive, inasmuch as they have approximate figures to show that such a plant may be installed for between $40,000 and $45,000 and that they therefore would not consider more than the latter figure, $45,000.

Interest The rate of 5 per cent is accepted. However, with the reduced initial investment of the plant this would reduce the operating expenses $250 per year.

Depreciation and Obsolescence The item of 10 per cent as given in the Edison proposition is considered high; 8 per cent is considered a fair figure, and using this figure and assuming the cost of the plant at $45,000 this would reduce the operating cost by $1400 per year.

Taxes and Insurance The figure of 2½ per cent is considered high, and they will accept only 2 per cent which, on the reduced cost of the plant would lessen the operating cost by $350 per year.

Repairs and Renewals The 2 per cent is accepted, but on the basis of $45,000 instead of $50,000 it would show another decrease in the Edison figures for private plant operation of $100 per year.

Sundries Accepted as given.

Labor Accepted as given.

Fuel The evaporation of 8 lb of water per lb of coal is considered low, and the engine performance of 27 lb per i.h.p. is considered high. With a modern plant such as they would install they claim they can obtain 10 to 1 evaporation of the boilers and a steam consumption of at least 22 lb per i.h.p. with their engines. Efficiencies are accepteed as given. This difference in boiler and engine performance would make a difference in coal consumption of 637 tons, which would represent another saving in favor of the private plant of $2420 per year.

Fuel for Heating Building For heating the building at night and supplying auxiliaries 370 tons of coal is considered high, and only 100 tons will be accepted for this item, making a difference of $1026.

Fuel for Live Steam Needs Accepted as given.

Ash Removal Accepted as given.

Water Accepted as given.

Rental Value of Floor Space The item of $1500 is not accepted, inasmuch as they claim that they would protect themselves by providing space for a plant even should the Edison proposition be accepted.

Executive Attention Item of $1,000 is not accepted as they claim this item would not actually show on their books.

Breakdown Connection Accepted as given.

UNDER EDISON SERVICE

Interest Accepted as given.

Depreciation This figured on a basis of 8 per cent would reduce the cost of operating under Edison service by $80 per year.

Taxes and Insurance Accepted as given.

Repairs and Renewals Accepted as given.

Labor Accepted as given.

Fuel for Heating The figure of 990 tons is considered insufficient. It is claimed 1500 tons would be required, which would increase the cost of operating by Edison service over the price given by $1938 per year.

Fuel for Live Steam Accepted as given.

Water Accepted as given.

Floor Rental This item is not accepted, which would decrease the cost of operating under Edison service by $144.

Electric Current Accepted as given.

The Consulting Engineer then summarizes his objections by showing that according to the revised items the net results show a saving in favor of a private plant of $4,955.20 per year, and he advises the Owners that they will be better off by installing their own plant, as they may not only save this amount of money per year, but they will be independent of any outside source for the operation of their factory.

The salesman then states that the Edison proposition has been carefully prepared and checked and stands on its merits alone, and that no arguments have been advanced, or no substantial reasons given why any change should be made in the proposition as originally submitted.

Taking the items which the Consulting Engineer has objected to according to their order, he represents approximately the following arguments.

The figure of $50,000 given as cost of plant equipment is made up as follows:

Boilers	
2—250 hp fire tubular boilers 1—200 " " " "	$12,000
Piping (including piping for pumps)	4,900
Pumps, Feedwater Heater	
2—Boiler feed pumps 1—House pump 1—Sump pump 1—Fire pump 1—Feedwater heater	3,800
Engines & Generators	
2—Tandem compound, non-condensing engines direct connected to 2—200 kilowatt d-c generators	14,200
1—Tandem compound, non-condensing engine direct connected to 1—150 kilowatt d-c generator	5,600
Switchboard	
3—Generator panels complete with necessary indicating and recording meters, switches, etc.	1,750
Wiring	
Necessary wiring for connecting up plant generators	1,100
Stack	
Stack (including foundation and setting up)	2,500
Foundations	
Foundations for boilers, pumps, engines and generators	2,200
Total	$48,050

These figures total $48,050 and allowing 4 per cent for extras and contingencies, brings the cost to $50,000. This figure is based on the prices of standard apparatus, and should stand as submitted, for if the initial cost of the installation is reduced below this figure, inferior apparatus must necessarily be installed, and this would increase the cost of operating the private plant by increasing the items of fuel cost, repairs and supplies.

Interest

As the item of 5 per cent has been accepted by the Consulting Engineer, it should be figured on $50,000 according to the argument previously presented. Furthermore, in this particular instance, money should be worth more than 5 per cent to the Owners, inasmuch as it is a growing business, and therefore, "fair profit" could very well enter into the costs. As it is reasonable to suppose that money is worth at least 10 per cent to the Owners, 5 per cent in excess of that given in the Edison proposition could then very well be added which would show a further difference in favor of the Edison system of $2,150.00 per year.

Depreciation and Obsolescence

The Owners are referred to the clause in the proposition which states that the life of a plant should not be determined so much by when it becomes physically useless, as by when it becomes obsolete, at which time it should be replaced by some more efficient apparatus. With the continued improvements that are being made in plant apparatus, ten years is considered by progressive manufacturers a conservative length of time for any plant to operate economically. Furthermore, in this particular instance cognizance must be taken of the fact that the central station rates for power in Brooklyn have decreased approximately 35 per cent in the last ten years, and it is reasonable to suppose that this ratio will continue. Therefore, if a private plant be installed, while its cost of operating will remain fixed, or steadily increase, the central station rates will be decreasing. On this basis, even if the claim of the Consulting Engineer that a private plant would prove cheaper at this time is allowed, power could be purchased cheaper within a few years. When this time occurs, the private plant becomes obsolete, and it should then be replaced by central station power. Therefore, this item should be accepted by the Owners as representing a conservative value.

Repairs and Renewals No change is made in original proposition.

Taxes and Insurance This item is taken from the actual rate of taxation in Brooklyn for the year 1915, and the actual valuation which will be placed on the property by the assessors. This is not an assumption, but the actual figures which will be used by the City, and the Owners may very easily confirm this figure by taking the matter up with the proper City Department.

Fuel The difference in boiler evaporation between 8 pounds in the Edison proposition and 10 pounds claimed by the Consulting Engineer, is the difference between the theoretical evaporation of a boiler and that found in every day performance. There is no question that certain boilers can evaporate 10 lb of water per lb of coal under ideal conditions. This is simply a question of expert firing and proper draft regulation, but this figure must not be accepted as in any way applying to the every day performance of a boiler in the average industrial plant.

The average fireman is not capable of firing a boiler according to theoretical or laboratory practice, nor does he have time to do so. He regulates his draft and puts coal under the boilers according to the practical method of keeping a certain steam pressure on the gauge. In other words, practical conditions and the human element more than account for the difference between 8 and 10 lb of water per lb of coal in this proposed plant. Furthermore, the figure given as 8 pounds of water evaporated would be above that obtained from the average of all the plants of like capacity operating under the same conditions in Brooklyn.

Regarding the question of engine performance, the Consulting Engineer claims 22 lbs of steam per i.h.p. as against 27 lbs claimed in the Edison proposition. Here again enters the question of theoretical against actual practice. True, a modern compound non-condensing engine might be able to produce a horsepower on 22 pounds of steam. However, the steam would have to be absolutely dry at the throttle; there could be no back pressure whatsoever on the engine, and it must operate constantly at full load. In other words, all conditions must be ideal. Under actual conditions, dry steam would not be obtained at the throttle unless superheaters were used in the boilers, which are not being considered in this proposition; there would always be some back pressure on the engines especially in the winter months when the exhaust would be used in the heating system; and there would be a comparatively small portion of the time, if any, when the engine would operate even at approximately full load.

Data available from actual tests of compound non-condensing engines of about the size in question, operating under usual factory conditions, show an average steam consumption above that given in the Edison proposition.

Heating of Building The total of 370 tons of coal given as being necessary to furnish steam to the auxiliaries and heating the building at night is most conservative. It is only reasonable to suppose that the auxiliaries alone would use 250 tons per year, and this would leave only 120 tons as necessary for night heating and the banking of fires.

Value of Floor Space The Owners are referred to the summary of the proposition, wherein is explained the charge made under this item.

There is no space in any building in Brooklyn which has not some value, and 20 cents per sq-ft used in this proposition is below the average rental value of space in a modern concrete building. Not only should this item stand as given, but the *cost of creating this space,* it being located in the basement of the building, could very well be added to the *"Fixed Charges"* of a private plant.

Executive Attention This item is explained sufficiently in the proposition itself, and attention is drawn to the fact that in any progressive firm such as that represented by the Owners, general supervision by the executive members of the firm should be charged against the different departments or branches affected.

The operation of a private plant having the important bearing which it does on the output of the factory, and involving a yearly cost such as represented, must require a certain amount of this supervision, and the amount given as $1,000 is but a modest figure to cover this expense.

It is true that if the private plant were eliminated the salaries of these men would not be reduced. However, as executives, their time would be available on other problems in connection with the business, where they might show still greater efficiencies.

UNDER THE EDISON SYSTEM

Depreciation The same argument is given as on this item under private plant.

Fuel for Heating The Owners are referred to Fig 5 showing the actual tons of coal used for heating and live steam in a shoe factory in Brooklyn. It will be noted that the factory given in this data sheet contains 96 000 sq-ft of floor space, whereas in the proposed factory of the Owners there will be 210 000 sq-ft. Direct comparisons between square-feet and coal burned, confirm the figure of 990 tons quoted in the Edison proposition. These figures cannot possibly be refuted, as they are authentic under like conditions.

The Owners are referred to the particular factory on which these data were compiled to substantiate the figures given.

Floor Rental The same argument is given on this item as is given under private plant operation.

SUMMARY

The salesman then sums up his argument, to the effect that every figure in the Edison proposition should stand absolutely as submitted, as, from a practical engineering standpoint, there have been no arguments advanced and no reasons shown why any modification should be made, with the possible exception of such items as "fair profit" and the "creating of floor space," acceptance of which would make a still greater difference in favor of the Edison proposition.

The report as submitted represents the true cost of operating by either system, as nearly as can be ascertained by engineering practice with proper allowance made for the difference between theoretical and actual conditions.

Attention is again called to the fact that the cost of private plant operation is steadily increasing due to the increased cost of fuel, labor and supplies, while the rates for central station service have decreased 35 per cent in the last ten years and must continue to decrease as their loads increase and with new developments in generating apparatus; also to the fact that after a year's trial of central station service, if results are unsatisfactory, the Owners will be in the same position as far as the purchase of a plant is concerned as they are now, while if central station service proves satisfactory, the Owners will have saved $50,000 for investment in profitable business activities.

The only logical way to look at the situation is that the Brooklyn Edison Company can generate this amount of power cheaper than the John Doe Company can, and if the Edison Company is willing to sell this power for a small margin of profit, it can save the John Doe Company money over the cost of making it on the premises.

The best evidence that this condition exists at the present time is the number of progressive manufacturers who have discarded their private plants and adopted central station service and reference is made to the list of such plants in Brooklyn already submitted to the Owners.

CONCLUSION

Whether or not this proposition is closed in favor of the central station company on the basis of the arguments submitted, is, of course, dependent to a very considerable extent on the manner in which these arguments are presented by the salesman. In other words, the personal factor enters largely here and the individuality of the salesman and his capacity to persuade and convince is likely to prove the deciding element. Much has been said and written on the "psychology of salesmanship," and as already stated, to dwell upon this feature of the subject is foreign to the purpose of this paper.

Whether the sale described in the foregoing has been consummated or not will be left to the decision of those present, and it is hoped by the writer that on this and other points some valuable discussion will ensue.

CHAIRMAN JONES: This is the first time the Section has ever had a paper which gives such specific detail as to the handling of a particular case. The National Cash Register Company is one of the greatest selling organizations in the country. It has meetings of its men in which one of the salemen confronts another and tries to sell him some goods. The detailed conversation which is held is the subject matter for discussion. This paper should provoke a great deal of interesting discussion here. We want to have quick, sharp comments, and will start in with a five-minute limit.

DISCUSSION

Mr. R. B. Mateer, Riverside, Cal.: I enjoyed this paper very much. Two or three times during the reading of it the thought has come to me that it might be well to make a few remarks relative to the formation or foundation of a power department. It appears that in 1902 Mr. Henry L. Doherty first started a power sales bureau in his organization. At that time he began an active campaign against the isolated plant. The result of his efforts was a power sales bureau, consisting of one and sometimes two men, but at no time or period cumbered, as it were, with such an organization as is recommended in this paper for a power sales bureau. It seems to me that a power engineer, a power salesman, a chief clerk, a messenger, and the few other officials mentioned here, make a cumbersome combination that would check any individuality that exists in the salesman.

Chairman Jones: How big a company are you referring to—how many subscribers.

Mr. Mateer: The company I was with at one time had 20 000 subscriptions.

Chairman Jones: The comment you are making now is in relation to a company supplying that many customers?

Mr. Mateer: The company had at one time 50 odd isolated plants and to-day it has less than 10. In many of those plants steam has been replaced by motors. Now it has pulled out all the old equipment, so far as possible, and looks toward the load-factor and operating for economy; but new work is still handled among those organizations without such a bureau as is outlined in the paper.

Another feature in the paper that rather interested me was the reference to a consulting engineer. I do not know how it is that he generally gets in, but I have found it usually works out that I can eliminate the consulting engineer if I can get in touch with the owners of the business, making the personal equation the principal factor.

Mr. M. O. DellPlain, Syracuse, N. Y.: This is in my estimation a most excellent paper.

At a convention in St. Louis several years ago I took the stand that I did not believe in segregating the power engineer and the power salesmen except in the case of a few of the larger companies. I am still of that opinion.

There are three points which I would like to bring out as being of special value in closing power sales. One point is that the prospect is in just as good a position to put in an isolated plant at the end of a year's trial of central station service as he is in the beginning and therefore there should be no objection to at least a year's trial. This is brought out in the paper, and I believe it should be especially emphasized.

Another point is that the manager of an industrial plant is too busy with the details of his own business to give the attention necessary to the production of power.

The third point is that a competent power engineer can analyze and suggest improvements in the prospect's methods and processes. I think a thorough knowledge of the prospect's manufacturing methods and processes is more essential in closing a power sale than a knowledge of electricity.

CHAIRMAN JONES: It might be well, in discussing this paper, to bear in mind the organization outlined by Mr. Stevens, because the detail that he refers to is for a city of a stated size. In a community smaller than that one salesman might perform two or three of the functions which are designated to several individuals under the system Mr. Stevens outlines.

MR. M. C. OSBORN, Spokane: We have had very little to do with power sales for some years. We do sell power in what we think large quantities for mining and concentrating purposes in the Coeur d'Alene in Idaho. It is not difficult to sell there, because they know just what they want. If they put up a compressor or a hoist, it is really ordered before I get the order for the power, which is usually additional power for an old customer. We have a 12 000-hp load, and about 28 or 30 consumers. That is a very good load. We have a load-factor of around 60 per cent, and it gives us a revenue of about $35 per kv-a year, with a rate of $3 per kv-a per month. The rate has recently been reduced to 6¼ mills straight.

MR. J. G. LEARNED, Chicago: This paper fills a long-felt want in giving us a concrete example of what should be done. One thing that has impressed me in the paper is that there is no statement in it that the company is going to make a saving for the customer. In other words, the company does not put itself on the defensive throughout its negotiations with the prospective customer. That I think is a feature usually included and impressed upon our members. Ordinarily, the average power salesman will become enthusiastic with his customer, and one of his strongest arguments is that he is going to save the customer some money. The facts are that in nine cases out of ten you do not save the customer money. Possibly this is not true in some communities—I am speaking of our own. If we can break even with the customer, we are doing him a great good. We do not want to put ourselves on the defensive at the start.

Unfavorable reference has been made to the consulting engineer. I think we should encourage engineers. These men go through college and spend all the way from $3000 to $5000 on their education. They, as shrewd business men, must capitalize that investment and earn a substantial return on it. Being human, they will naturally recommend that which immediately or ultimately will bring the largest financial return—an isolated plant. Each installation will also serve them as an advertisement for future business.

There is however one fallacy in this theory. History repeats itself, and the central station eventually supplants the isolated plant, thereby demolishing the very keystone of permanent success. We should encourage them along the lines of economy engineering, because the time is coming—and it is not so far distant—when a manufacturer will not consider anything but central station power. That may be five years in the future in some places, ten in others, and possibly twenty-five in others, but it is bound to come. When that time arrives, and all the power that is put into a community is taken from a central station company, the necessity for economy engineering arises. Then your consulting engineer is the man you will have to call upon for cooperation in continuing your successful business.

Mr. R. L. Lloyd, Philadelphia: Reference has been made to the item of "Interest." It seems to me that there has not been enough attention given to that subject. I think it is fair to assume that a manufacturing firm is operating on borrowed money. Very few of them do not have to go out and borrow money with which to conduct their business. They are paying probably 5 per cent for that money. The ordinary profits, gross profits, of all their capital may probably run as high as 20 per cent. Now, we can show them that this $50,000 item which would go into a plant, if it were put into the productive part of their business would be expected to return the same rate of interest as the other capital.

namely 20 per cent. They would, of course, subtract from that the 5 per cent interest that they have to pay to the bank, which leaves a balance, say 15 per cent, which should be charged against the power plant. If they borrowed that money and put it into boilers, steam engines and generators, they would ordinarily expect no return on it above the regular interest charge. We could very well use the argument that they should show an additional profit over and above this 5 per cent or 10 per cent as Mr. Stevens mentions, to cover the profit they would make if they invested the money otherwise in the business. I feel quite sure that one of the power contracts I closed was due to making that argument very strongly.

MR. C. N. STANNARD, Denver: I think we are all very much interested in the power branch of our business. We all realize that a valuable load is to be secured in this line. Some years ago it was expected the ordinary salesman would handle the power situation, but I am convinced that what we need now is the rare combination of a good salesman and a technical engineer. He is bound to come into contact with technical men on the large propositions, where the prospective consumer will ask various questions which it is just possible that the brightest salesman could not answer, but the technical salesman, if he be a good one, the only kind we want, can. It is our experience that a technical salesman is the real salesman and oftentimes secures business which the non-technical salesman alone might not be able to get.

I am inclined to think that with a reasonable price for our commodity and good service, and with bright, active, earnest solicitation, we can secure practically all the power business that is to be had in our various communities. In other words, try to make the service so popular that the first thought of the prospective user is electric power. Then it seems to me that we have paved the way to securing the business, not only in the small units but in the large units. I therefore very heartily recommend that the power salesman be a technical man.

MR. R. H. KNOWLTON, Philadelphia: I have noted this paper with a great deal of interest, and I wish to call attention in passing to one point, namely, that in this particular case, the consulting engineer has been called in following the submission of the detailed, and in many ways, very technical report.

I think that very frequently the manufacturer looks upon the power problem as one that is not altogether too deep for him to solve himself in connection with his architect. However, when he finds that the power salesman has submitted a voluminous and technical report, he immediately begins to realize that he is not qualified to pass upon it, and finally he employs a consulting engineer.

We all know the general attitude of the consulting engineer. If he wishes, he is able, in the absence of the power salesman, to convince the prospect that the report is replete with erroneous assumptions.

I believe that such a report should be submitted to a prospect only when it is seen that the latter is desirous of having one, or when it is evident that the business cannot be secured in any other way. Even under these conditions, a copy should not be left with the manufacturer, who may possibly hand it over to his consulting engineer, but should be retained by the power salesman with the statement that he will be very glad to go over it again at any time in conjunction with the manufacturer and his engineer.

CHAIRMAN JONES: I will ask Mr. Burnett to take the chair, because some of the details of this report I am perhaps responsible for, owing to the fact of its being a description of my organization. The average man who reads Mr. Stevens' report is probably impressed with the idea that there is too much individual detail to such an organization.

I might say, as I said from the Chair a few moments ago, that any one of the functions here performed by two or more individuals might be confined to one individual, all depending upon the size of the plant served.

The point brought out by the last speaker, as to the submitting of the proposition, is a most important one. It is true that there are conditions where the submission of a report to a consulting engineer would ruin all chance of a successful conclusion of the deal; on the other hand, there are conditions under which this must be done. A large financial man, I am referring now to a high-class, up-to-date business man honorable in every way, will come to a consulting engineer and say, "I want you to give me a detailed explicit engineering report, as to my particular plant. We want a report from you as to what your service will cost in the operation of such a plant as I have." He has not the time to listen to the oral persuasion of our salesman, and to such a man as that a report must be prepared and submitted for his personal perusal.

It has been my experience in employing men that nine out of ten men who apply for positions have not a spark of salesmanship in them. You cannot teach a man how to sell. It has to be born in him. If nine out of ten men who come in do not know how to sell, how much larger must be the number of technical men who do not know the science of salesmanship.

Mr. Stevens' force has canvassed Brooklyn (consisting of nearly 2 000 000 inhabitants), and has a record of every plant there. These reports contain the data upon which the salesman gets the job. A technical history of each prospect is given to the salesman, and upon that he bases his work. The foundation has been laid by the engineer. I am particularly interested in this phase of our business, and would be glad to hear it thoroughly discussed here.

CHAIRMAN BURNETT: We have now heard from the eastern side of our organization and I think we should hear something from the western side. I would like very much to hear from Mr. Walton.

MR. S. V. WALTON, San Francisco: I have not yet had the time to read Mr. Stevens' very excellent paper, neither have I heard all of the discussion, but one of the things I did hear that interested me was the discussion as to the report of the consulting engineer on a consumer's plant, particularly the plant we want to get on our central station service. In every city there are of course consulting engineers anxious to be called in on any proposition that is good business for the engineer, and among that number are always those who are anxious to save money for their clients. In most cases that means that they are in favor of changing over to central station service, where such a change would reduce the operating costs. So far as the operations of our company are concerned, we have tried to carry out this work ourselves, through our new business getting department. We have an industrial department that makes a specialty of going after that class of business. I might say in general, that outside of the territory around the Bay here it is a well established fact that large consumers of power are very easily converted to the idea of using central station service. I mean particularly such industries as gold dredging, cement manufacturing and various other large industries that were referred to fully in Mr. McDougal's report, presented on Wednesday morning. Such plants cannot operate successfully without central station service, and the question becomes one of the rate the consumer can afford to pay. As the load-factor in these cases is very high, the return per kilowatt per year is more important to the power company than the rate per kilowatt-hour. Gold dredging, in particular, is a class of business that was tried by using steam power, but this was not profitable. The very high cost and great weight of the steam equipment was more than the business would stand. On the introduction of hydro-electric power, however, gold dredging became a very important industry in California.

Recently, here in San Francisco and at some other places on our system, we have come in contact with the Diesel engine. I had hoped that at this Convention we would be able to have some discussion on this subject. We have a few installations here in San Francisco, particularly in ice plants, where the use is continuous, in which the cost at the switchboard is not over ¼ cent per kw-hr for fuel and lubricating oil, and about ½ cent per kw-hr for all costs, including interest and depreciation. These plants have not been operating as yet a long enough time for us to determine how they are going to work out finally, but from present indications the Diesel engine will prove satisfactory for this class of business, on account of the extremely high load-factor, and it appears that they will be able to make their power at a cost so low that we cannot hope to compete. The Diesel engine people themselves say that some day they will drive us out of business, but in my opinion, if they are going to get as satisfactory results as that, we shall use Diesel engines in our central stations, as the central station idea will always remain the same.

As far as discussing this particular paper and the methods of making power sales are concerned I am reminded of what I told a Japanese who was here in San Francisco a few months ago. to find out how we had built up such a high load-factor on our system. He had three or four typewritten pages of questions. and I have to confess that some of the questions were so technical that I did not understand them. In order not to show my ignorance I asked him if he did not want to load up his station. He said that he did. I then advised him to go home and start a campaign to get everything that moved to move by electricity. In that way the proper diversity and load-factors would automatically be obtained. He thought the matter over for a few days and then told me that I had given him a really good idea. I think that out here in the West this is quite largely what we have done. We have tried to make everything that runs run by electricity.

We have recently been obtaining very good results by making a careful survey of our present power consumers. In nearly every case we have been able to get them to add other power-consuming equipment, resulting in some reduction of manufacturing costs. This additional business is obtained at a very low cost and is really more desirable than entirely new business, for which additional lines, transformers and meters have to be installed.

I do not wish to leave the impression that we do not give any attention to developing a power sales organization, as we have a large force engaged in such work, but it is not the problem here that it is in the eastern States, where rates for central station service are higher and where exhaust steam for heating is a factor. I believe in time to come conditions here will change and we shall find it necessary to adopt many of the more refined methods that have been so successfully worked out by the eastern companies.

MR. C. A. LITTLEFIELD, New York City: I hardly think it necessary to make mention of the fact that we have a considerable power load in New York City.

Mr. Jones has told you something of the Brooklyn conditions, but across the river we have a little burg that does something in the way of power distribution. The power conditions in New York City (and by that I mean the Borough of Manhattan) are somewhat peculiar. We have very few, if any, of the large power developments such as have been referred to and described by representatives of San Francisco, Los Angeles, Chicago and other places.

Speaking generally, and not in specific detail, there are few distinctively large manufacturing concerns on Manhattan Island, a condition that is due, as you will readily appreciate, to the peculiar conditions of that part of the City itself. In the outlying territory of the Greater City, such as the Boroughs of Bronx, Queens and Brooklyn, the conditions are different and there is a considerable power development with great future possibilities. On

Manhattan Island, however, we have a very large power load consisting of a great number of relatively small equipments. A factory building may be erected to utilize several hundred, or even as high as 1000 horse power, but these will be divided into small units, each individual contracting for his own equipment, or in some cases the owner contracting for the bulk supply and arranging with his tenants for their individual consumption.

New York City is probably one of the largest, if not the largest, garment producing communities in this country, and practically the entire industry uses electric power. In some of the 15 or 18-story loft buildings we may have as many as 25 or 30 customers using an aggregate of 50 to 75 horse power each, which by a little calculation will show the total consumption to be considerable. You will therefore appreciate that this supply differs from the large power installations, such as have been referred to in the discussion of this morning.

In reference to Mr. Stevens' paper on the development of the salesman himself, the discussion on this point is to my mind one of the most important that has been brought before this Section, and if for no other reason, valuable as the paper is as a whole, this would justify its presentation.

I do not think that we can too greatly emphasize the need of a higher class of men in our selling departments. I do not care whether the man sells shoe strings or electricity, the fundamental principles of salesmanship have to be developed. In our business, the technical salesman is, of course, the most valuable, but as between an engineer and a salesman, the latter is the one who will produce results and therefore should be given the preference. In times past anybody was employed who could make a sale and little thought was given to character, appearance or ability, but those times, thank goodness, have passed, and we are now in the position where the industry is employing men of higher intellect, as well as character.

The attitude taken by some of our leading corporations in educating the salesman is one of the most notable developments of recent years. The corporations have realized that they themselves are the ones who benefit from this higher class of employees and have found them a sound economical investment. They spend thousands of dollars annually in educating their employees, if for no other reason than that they may themselves obtain the benefit.

The more emphasis that can be placed on this subject and the sooner this fact is brought home to the executives of our respective companies the quicker will satisfactory results come to the industry at large.

I visited the Exposition yesterday and while there talked with a representative of the Diesel Engine Company. The development of the Diesel oil engine has, as you all know, been going forward with tremendous rapidity of late, and I think, as these people perfect their product and bring it before the public with well-instructed salesmen, we shall feel the effects of this competition. Therefore, unless we have people properly educated and men trained to meet this competition and who know how to intelligently present their case, we may find that company making considerable inroads upon our business. We should all pull together. I want to emphasize most strongly this fact, and as well, the fact that honest men, trained men, and men who have had thorough instruction, should be preferred as salesmen.

MR. S. M. KENNEDY, Los Angeles: I would like to emphasize the points brought out by Mr. Littlefield and Mr. Jones in relation to the question of the qualifications of salesmen. My experience in connection with the power business is that we want salesmen first and engineers afterwards. We need trained power salesmen, but we want them to have engineering knowledge also, which they can use in connection with their knowledge of salesmanship. You must remember that, after all, it is the salesman that gets the name on the contract. If I am picking out a commercial engineer, I look into his salesmanship qualities first. If I am picking out an industrial engineer, I want to know first what kind of a salesman he is. For a power contracting engineer, I apply the same acid test.

Now, in connection with this subject, I am going to take exception to one statement in the paper—"Power engineers. These men do not come in contact with the prospective customer, but are called upon to test engines, boilers, motors and other apparatus, to figure results of test, plot curve sheets, work up engineering data, and to otherwise assist power salesmen. They are primarily technical men whose chief qualification should be accuracy." I quite agree that technical men should be accurate, but I consider that the men selected to go into the plants of prospective customers, to be turned loose there among engineers, employees and others, should be tactful men as well as technical men. They should be salesmen in embryo, men who have the qualifications that will lead them away from mere technical matters, and who can be depended upon to keep always in mind the idea of having the contract signed. I do not believe there is anything more important in our contact with the prospective customer, than that he be approached by the right class of men. I know in my own experience that power contracts have been lost, or at any rate delayed because the men sent out were of the wrong sort.

There are two classes of power prospects. The man that is opening a new plant and has a receptive mind wants to see what he can get. The other one is the man who has had a plant in operation and may be interested in electric service. It takes different kinds of men to handle the two. Here in California, our people are pretty well educated to the use of electric power, and we do not have much difficulty under ordinary conditions, where the load-factor is not too high, in inducing manufacturers when they put in their first installations to use electric energy. To displace a plant in which a prospective consumer has invested a large amount of money and is likely to lose a lot of money by installing electrical energy, requires salesmanship of a high grade.

There is another thing to which I should like to take exception. I am not in the habit of taking exceptions, but my friend Mr. Learned has made a statement that I cannot stand for. He has said that we cannot show the consumer a saving under ordinary conditions in substituting electric energy. Now, if we out here in California cannot show the prospective consumer a saving in money, we might as well step aside and get out of the business, because the oil engine, the gas engine, and other prime movers would take all there is. The money saved is represented by several items. It is not the mere fuel cost, and it is not the mere labor expense; it is not the ordinary operating expenses as we know them. Out here we think a good deal of saving trouble. Trouble means the loss of time. Out here we think a great deal of continuity of service, because where there is not continuity there is loss of efficiency and loss of output. When we take these items into consideration, as well as the bare, naked operating expenses along with the interest and depreciation charges, we find that we can save the consumer a considerable sum of money, the amount depending, of course, upon the size of his business. If this were not true, we could not sign the number of power contracts which statistics show we have to our credit in this region.

Chairman Burnett: We have heard from Chicago, and just now from Los Angeles, and I would like to ask if Mr. McDougal will tell us some of the methods used in getting those splendid illustrations of large power consumers that were included in his report of the other day.

Mr. J. H. McDougal, San Francisco: I think Mr. Walton has covered that point pretty well. In nearly every case they come to the electric power company. Ordinarily, out here in California, the first thought that a man has when he is putting up a new plant, is to come to the power company and find out what he can do. He can usually do so well with us that he does not go any further.

We have a good many cases out here where steam is required in the manufacture of the product. In many instances this can just as well be exhaust steam as live steam. In a majority of cases the consumer uses exhaust steam and simply takes our service to supplement his steam power. We have tried for some time, looking into these conditions, to see if it were not possible to convince a consumer that it would be more advantageous to use live steam, but in a few cases only have we been able to do so.

We are now taking up some interesting work in connection with ice plants. We hope that by the time you come out here again we shall have something fine in that line to show you.

Mr. Learned: Regarding that portion of my remarks to which Mr. Kennedy takes exception, I qualified this statement by saying "Our own situation." As a matter of fact we do not place ourselves on the defensive in attempting to sell power, we talk service first and price last.

Competition is so keen in the manufacturing field that the average manufacturer cannot afford to devote any of his time to the operation of an isolated plant. In the first place, the cost of power required in the average factory is only about 2 per cent of the total cost production. Therefore, if we do not save anything for him he is money ahead, for he can use, in the conduct of his business, the capital which he might otherwise employ in a private plant, and by giving it the usual yearly turn over and crediting the profit accruing from such a turn over to power operation, the showing will be decidedly in favor of central station service.

While listening to the discussion the thought occurred to me that we are surrounding this very important part of our business with apparently unnecessary difficulties and obstacles. We have long passed the stage when we are on the defensive. Why should not the consulting engineer, the manufacturers, or any one else advocating isolated plants be placed on the defensive? What justification have they for even considering anything other than central station power, when so many successful firms engaged in the same line of endeavor have already availed themselves of central station power? Almost any central station can with pride point to a long list of satisfied power customers, the most convincing argument at our command.

CHAIRMAN BURNETT: This paper indicates the method the author finds is the most successful in obtaining his power business. I should judge that some such method as that outlined in the paper must be used here in the West for filling up these companies. Certainly, a vast amount of detail work has to be done in connection with getting this business. I only wish I could show to you gentlemen the detailed data that were collected by Mr. McDougal in connection with the report on typical power sales. In the West here, there is a great deal of detail work done. There must be a very wide difference in the methods of getting power business. We want to hear more about it. We want to hear not only how the men get business here in the West, but how they get it everywhere.

MR. A. W. CHILDS, Los Angeles: I feel that the paper and discussion have very clearly and fully brought out the point of selling. A combination man using salesmanship with engineering knowledge in power matters, is difficult to find. No doubt we have all given considerable thought to this phase of the subject, and probably agree that an engineer is not ordinarily a salesman as well. His mind does not run to selling thoughts. It might be in extreme cases, even when an engineer has unusual ability in his line, that an utter absence of interest exists as to whether the sale is actually consummated or not. As a rule, the engineer does not live in a selling atmosphere. He is of a mechanical, mathematical turn.

Now, your salesman is quite the opposite. He is a "closer": he is more of a promoter, in a way; waving non-essentials to one side, side-stepping when necessary; all the time leading the prospect along to the closing point. That is his goal—the consumer's signature on the little dotted line.

I have found that we can use team work in our selling, but the power salesman should be the one to direct the sale. He is the man who is held responsible for bringing in the business. Of course if the business is important or difficult it is frequently discussed in the office. The salesman brings in his report, questions are asked and answered, and he is sent out again with suggestions. He consults the engineer and if necessary takes him along. When technical questions arise that the power salesman cannot answer, the engineer is ready. Then how desirable it is if the engineer has some sense of the commercial end of the business, otherwise the salesman must look sharp that the whole "kettle of fish" is not spoiled in one interview.

Our life-insurance friends have this selling skill down to a fine point. While their salesmen and agents are able to intelligently and adroitly answer any questions, and meet almost any situation, yet they have special men for "closers." There may be a lesson in this for us. I think the gist of this excellent paper is contained in the last paragraph, where it states that the salesman must be forceful and convincing, and that he must close the transaction.

MR. OSBORN: Since listening to this discussion, I do not know but I have something to say that will be of interest. I am a member of the Industrial Committee of the Chamber of Commerce in Spokane. We are a very hard-working committee. We meet almost every Monday night, and discuss industrial matters pertaining to the welfare of Spokane. I have not had a great deal of pleasure in attending these meetings, for the reason that at almost every one of them something comes up about the high cost of power. For the purpose of getting at what it really amounted to in manufacturing, I secured a confidential report from Bradstreet on the cost of manufacture of several articles made in Spokane. I found that the average cost for power in the manufacture of articles was a fraction less than 2 per cent; the highest was 4 per cent; the lowest was 0.2 of 1 per cent. That is the cost of the power in relation to the total cost of the manufactured article. I sprang that on the Committee, and since then I have enjoyed the meetings more than I did before.

We furnish considerable power to flour mills in our section, and they use hard wheat, too, by the way. Those old mills have used the line shaft and one motor, say a 100, 150 or 250-hp motor, operating 12 hours a day with power costs at $40 per hp-yr, and the cost runs to about 5½ cents a barrel. They are now putting in individual motors and roller bearings, and are getting it down so that two mills are now manufacturing flour at a cost a trifle less than 3 cents per barrel, working continuously at $40 per hp-yr.

In the Coeur d'Alene in Idaho we find that to manufacture or to mine, the power being used for the purpose of compressing air for the drilling machine, hoisting, traction and pumping, and in some cases for superheating the air which is sent into the tunnel for hoisting purposes, cost, in 1914, 17 cents per ton per mine run, with power at approximately $35 per hp-yr.

MR. H. P. PITTS, San Francisco: In the San Francisco district of the Pacific Gas & Electric Company, a part of the system is the industrial engineering department. It is not known particularly as the industrial department, as it pertains to the larger companies that sell apparatus or appliances. The industrial department is practically a commercial engineering department, that does such work as Mr. Stevens has brought out in his paper. In looking this paper over, I find that it is almost an exact duplicate of a report that we got out several years ago on a large glass manufacturing concern, by which we were able to convince the prospective consumer that he should have electric power. The firm is now using electric power, due to the report that was made. In making this report, we asked to have the plant turned over to us for a week or two. We put several men into it who knew the operation of the boilers, engines, and so forth, and went to one of the technical schools to get the graduating class to help us out. The result was that the report went fully into conditions. We found that it was costing the manufacturer for the production of the articles about four times more than he thought it was; he had no definite knowledge of what the cost had been. That is the case with many other manufacturers here in San Francisco. I have ascertained by making a study of their plants, that a great many of them do not know their power costs and very seldom give their costs the necessary consideration. They take the word of the operating engineer who makes the cost item as low as possible. We go to a prospective consumer and ask permission to operate his plant. We know how to get the capacity out of his engines. We operate the plant, and in that way ascertain exactly what it is costing him. If, then, he does not accept our proposition, it is all right. We tell him that we do not want his business if we cannot show him where he can save money, and where it is to his advantage to use electric power.

With reference to the matter of educating salesmen, that also is brought out in the paper. A man who goes to a prospect should know something about the business in which the prospect is engaged. We try to familiarize ourselves with his business; that is, the production end of it. In most cases we are successful, because managers are not, as a rule, engineers. After we get through, we generally tell the manager some things he did not know before. The mere matter of changing a belt in the factory, or putting in a pulley of proper size to increase the speed, etc, etc, has its effect. We act as his consulting engineer, if he will only give us his confidence.

Although it may seem a little personal, I will tell you about negotiating a sale of power to a large steel plant adjacent to San Francisco. The firm would not listen to me at all at first. They had bought several large second-hand Corliss engines and were operating them successfully, as they thought, but not knowing what their cost was. They did not know how many pounds of steam the engines were taking. I could not get into their factory. They would not talk to me at all, so I went to one of the superintendents and asked him if he would let me go through his factory. He said that they did not usually do that, but that he "guessed it would be all right," and that he would get a boy to take me through. I told him that I wanted him to go through with me. He thought about it for a few minutes and then said he would. We got about half way through the factory when I saw a man turning a steel roll in a lathe. He was not doing it the way we used to do it. I asked him if that was the way he always turned those rolls, and he said, "Yes, what is the matter with it? That is a good machinist there." I said, "Well, I have known of that work being done differently. Perhaps you might be interested in hearing how it was done." The result was that he learned a new method of turning steel rolls, and in that way I got his confidence. The outcome was that in three months we had 1200 horse power in that steel mill. I had started out by telling him something about his own business, and I got his confidence in that way. There is a great deal in having men employed in your industrial department or commercial department who know something about the business of your prospective customer. We try to manage that right along.

Mr. E. B. Criddle, Riverside, Cal.: This matter of selling power is the biggest thing we have to deal with. We generate the electricity, and if we do not sell it, it does not do the company any good. I am particularly impressed with the paper that Mr. Stevens has given us. While he has put in some routine that we do not need in our particular company, I can readily see how he may need it all in his locality. In our territory, Southern California, we cover a vast area of scattered business, and in many cases we have one man to a town. This man is superintendent, foreman of the line crew and salesman all in one. We make a special effort to educate all salesmen along salesmanship lines, and in dealing with the larger consumers we pick our salesmen.

Salesmanship is the thing that counts. I appreciate very much the suggestions made by some of the other speakers along that line. We want men who can deliver the goods. The personal equation, to my mind, cuts as much or perhaps more figure than any thing else in salesmanship, and when we go after a man's business, we try to send a salesman who knows as much about operating conditions as the owner of the business himself. It not infrequently happens that we are able to suggest the entire installation to the customer, sometimes without bringing in a consulting engineer, but the engineer is often a help to us. It sometimes strengthens our position very much to have him brought in. particularly if our facts are as they should be. We have followed somewhat the routine outlined by Mr. Stevens. We get up complete data, which show the operating conditions of the customer's plant, if it is already in operation; if a new plant, we show the prospective conditions. We have very frequently taken out an installation and put electrical apparatus in place of it.

We have one line of business here which you eastern people do not come in contact with. but we western folks are all familiar with it: that is irrigation. Here we have to contend with the low price of distillate, and the distillate that is known as "tops." I believe it is claimed that for irrigation purposes distillate at 12 cents per gallon is equivalent to energy at about 2 cents. We compete with "tops" at 2¾ to 3 cents, delivered to the customer, and as you see we cannot always show the customer an apparent money saving. We very frequently get in regardless of the apparent comparative costs. In fact, a large part of our business in Southern California for some time past has been the displacing of gas engines and I will say that it has been done by good salesmanship. I say it has been done by salesmanship because we could not always do it by a comparison of dollars and cents in the irrigation business.

MR. L. M. KLAUBER, San Diego: Our new business manager is unfortunately unable to be present. In his absence I desire to recite a few of our experiences along the lines of those brought out by the other Southern California representatives, placing particular stress on two points already mentioned. These are, first, the advisability of taking a prospective consumer to some installation similar to his own, already electrically operated, to show him the benefits secured when electricity is used. The other point is the necessity of having representatives thoroughly familiar with the consumer's requirements, in order to secure that confidence which is so essential to closing a deal.

At the time we started to go after the irrigation load, companies to the north of us, particularly the Southern California Edison Company, already had the business well developed, while we had not a single pumping plant on our lines. In fact our lines did not extend into the particular parts of the irrigation territory tributary to our city. In order to land some of this business we first sent our new business manager to visit some of the northern companies. By them he was very kindly taken around throughout their country districts, and thus secured a thorough practical grounding in the business. Later, when we were about to extend our lines into one of the valleys, at our suggestion a representative body of several farmers visited Pomona, Santa Ana, and other districts to the north where electric power was already extensively used in the irrigation field, and thus became acquainted with the advantages of its use. When the line extensions were made we had little difficulty in signing up these plants. After these first few pumps were connected to our lines, whenever a farmer talked of putting in a new plant, or whenever we ran lines near existing gas-driven pumps, we merely took that farmer over to some plant already electrically operated, and let the electric plant speak for itself. The prospective consumer would talk to the farmer operating the electrically-driven unit, thus getting directly from a man in his own business the arguments in favor of electric drive; and generally when he returned to his own ranch little time would elapse before we had his name on the dotted line.

This shows the necessity of putting an actual installation before a prospective consumer. We have found practical illustrations of this nature far better than quotations of operating expenses. However, this brings up the second point I wish to make, viz., the necessity of having a man thoroughly familiar with the prospective customer's business; in the case under consideration, the irrigation business. This is true where the rancher already has a gasoline engine-driven pump, but it is especially necessary where he has no pumping plant at all. Our irrigation man has become so familiar with ranching conditions that the farmer has only to give him a rough idea of the general arrangement of his farm, the acreage he desires to irrigate, the depth of water, the nature of the crops and such items, after which he can sit down with the farmer and within a very few minutes completely outline the proposed installation. He is familiar with the figures, with initial costs and costs of operation, he understands the irrigation business, and at once the farmer becomes convinced that here is a man who knows whereof he speaks. Furthermore, he knows when to cease selling, when to let the prospect become his own salesman, and this is a great point in the selling game. And so by this means we have become successful in the irrigation business. Our business has grown rapidly, notwithstanding the very low cost of distillate or "tops," and the ranches have readily become convinced that electric energy is the only thing.

To cite some specific examples, there is a little branch road only a mile and a half long in our territory and in that mile and a half we have over twenty-five 3 and 5-hp motors operating small irrigation plants. This is a berry district and these plants of course do not compare favorably as to consumption with the larger plants found in alfalfa districts, but they show what can be done even on these small farms. We try to secure all the business within reach of our lines. At present there is not a single gas engine operating on that little road, and less than three years ago there were at least 20 of them.

When the City of San Diego came into the market for power for the pumping of a water supply from the river bed to the heights on which the city is located, the salesmen for Diesel and other types of engines approached the city officials. Their figures were carefully worked out and showed a very low cost for power. We took the city engineers out and showed them our larger irrigation plants and submitted them our figures showing the cost of pumping to the heights by electrical energy, and we secured the business. It was not easy to get, but it was secured by visiting example plants and a thorough knowledge of the business. That pumping plant now brings us a continuous load of 500 kilowatts, 24 hours a day—a very nice piece of business to have on the lines.

Another example may be cited. In a certain district through which we were just about to build our lines, a rancher having a considerable acreage in alfalfa was about to install a new pumping plant. We worked hard to get his business, but he was anti-corporation, and finally installed a 60-hp gas engine. Three years later his engine was broken down and in need of repairs, and the cost of such repairs amounted to practically as much as a new 50-hp motor. He looked at his neighbors plants, electrically-driven plants installed at the same time he had put in his gas engine, but still practically as good as new, and as a result the old engine was discarded and he is now a satisfied consumer on our lines.

MR. KNOWLTON: I would like to state the points that in my mind distinguish the engineer and the salesman as we meet them today in the power sales field. I believe that both the power engineer and the power salesman will collect all the data possible in connection with the industry on which they are working. I think, however, that the power engineer will submit all the data so collected to the prospect while the power salesman will submit only such parts of it as he feels will be of particular interest.

A short time ago we had occasion to send a power representative into the Middle West in connection with the securing of a load of 700 kilowatts with a 60 per cent annual load-factor. The prospective consumer had already employed a consulting engineer who had submitted a very elaborate report which purposed to show that power could be produced with an isolated plant in that vicinity and under the conditions maintaining in this particular case, at a very low cost per kilowatt hour. Our representative was shown this report, allowed to examine it in detail, and at least by inference, invited to submit a proposition that would compare favorably with it. He studied this report and found that he was unable to agree with it in a great many particulars, but one of which I will cite at this time.

The consulting engineer had assumed a boiler efficiency without stokers of 70 per cent, with a fuel containing 30 per cent ash. Our representative's experience led him to believe that under these conditions a boiler efficiency of 55 per cent would be much nearer good practice. He called the prospect's attention to this point with the result that considerable antagonism on the part of the latter was aroused; in short the prospect took the position that our representative was in a way belittling the engineer's ability and efficiency, in doubting the figure given as the cost of steam delivered to the engine room.

At this point the salesman's ability came in play, for he immediately saw that the purpose of the report was not to show the prospect what he could reasonably expect to produce power for with an isolated plant, but for the purpose of impressing the central station representative with the fact that if he meant to secure the business he must name a rock bottom price per kilowatt-hour.

Our representative at once said, "Gentlemen, I am but casually interested in what you can produce power for in an isolated plant. I am here to tell you the very best that our company can do for you, and if you do not feel that this price compares favorably with the results you can secure from an isolated plant, we shall be forced to witness the installation of one on your part. Should you do so, however, I am satisfied that I can return to your office within two years and secure your business at the rate I am prepared to submit at present."

That ended the argument entirely on the consulting engineer's report, and I am pleased to announce that a contract was closed amounting to $40,000 per year, upon a basis of 40 per cent per kilowatt-hour in excess of the cost per kilowatt-hour as named in the consulting engineer's report.

CHAIRMAN BURNETT: I will now call upon Mr. Stevens to close the discussion.

MR. STEVENS: I am very much pleased by the way this paper has been received, and also glad that most of the discussion has not criticised the paper, but has rather elaborated on it.

Mr. Jones has covered very nicely most of the points in his discussion, so I will sum up very briefly.

It would have been impossible to write a paper on this subject that would apply to conditions in all sections of the country. The power sale which is given in this report is typical only of large cities such as Brooklyn and other centers, where conditions are practically the same.

In a small place such as the first speaker discussed it is obvious that the organization outlined in this paper would be altogether too elaborate to handle the work since there would be less competition and the methods pursued by the salesmen would of course be a different character.

There are also some of the cities here in the West where the central station companies are selling hydro-electric power at a figure materially less than it can possibly be generated for by private means, and in such instance, the question of salesmanship is not nearly as important a factor as it is under the conditions outlined in the report. It is not my intention to insist or advise that a proposition such as embodied in the paper should be submitted in all instances. We close a great many contracts in the East where these reports are not made up and where it is only a question of talking price per kilowatt-hour. We have conditions however under which we consider it absolutely necessary to submit such engineering reports. I also think that perhaps we have some conditions in Greater New York which are typical of Greater New York only, at least so far as competition is concerned. For instance, we had a proposition up with a firm which erected a large building in Brooklyn recently, where there were 40 salesmen of engine and boiler companies on the one job. On this particular proposition, the cost of a complete plant would have amounted to $40,000 to $50,000, therefore, the salesmen of the engine and boiler companies were the best they had and were probably averaging in salaries from $3,000 to $4,000 a year, and while each one was there to sell his own boiler or engine, they were all working together against the central station proposition, that is, each would rather have the order go to one of the other plant equipment firms than to the Edison Company.

Mention is also made in the paper of some of the consulting engineers we have to contend with in New York, and Mr. Jones in his discussion brought out very clearly the competition we get from them. I think it is safe to say that the majority of them, according to the ethics of their profession, do work on a commission basis, and this usually means that if a private plant is selected there will be a substantial commission to them, whereas if central station service is adopted, it practically means nothing.

I believe the only criticism that was made on the paper, was that by Mr. Lloyd of Philadelphia, who referred to the value of money in a growing concern, over the 5 per cent allowed in the report if invested directly in the business. I will refer Mr. Lloyd to page 453 of the paper, where particular emphasis is laid on this point and that while only 5 per cent interest is figured in the report itself, there is another item which might be called "fair profit," that could very well apply.

CHAIRMAN BURNETT: Will someone please offer a motion that this paper be accepted and printed in the transactions?

(Motion made, seconded and carried)

CHAIRMAN BURNETT: Your Chairman of the Hand-Book Committee, Mr. Russell, asked in his report for some further discussion, either on the floor at this convention or in writing, that would serve as a guide in an instructive way in the *Handbook* work. Does anyone wish to make any remarks in that connection? (No reply) I will now turn the Chair over to Mr. Jones.

CHAIRMAN JONES: The next item of business is the report of the Committee on the Chairman's Address.

MR. J. G. LEARNED: Your Committee appointed to consider the Chairman's Address recommends that it be accepted and spread upon the records, and that an expression of appreciation of the members of the Section be extended to the Chairman for his excellent conduct of the affairs of the Section, and his untiring efforts in its behalf.

Respectfully submitted,
JOHN G LEARNED *Chairman*
E L CALLAHAN
S V WALTON

(On motion made, seconded and carried, the report was accepted)

CHAIRMAN JONES: Mr. J. G. Learned will now present the report of the Nominating Committee.

REPORT OF COMMITTEE ON NOMINATIONS

Mr. Chairman: Your Committee presents the following names for the several offices to be filled:

Chairman Joseph F Becker
United Electric Light and Power Co New York City
Vice-Chairman E A Edkins
Commonwealth Edison Co Chicago Ill
Vice-Chairman Charles J Russell
Philadelphia Electric Co Philadelphia Pa
Secretary C A Littlefield
New York Edison Co New York City

Also the following five names necessary to complete the eighteen members of the Executive Committee, as required by the Constitution:

N H Boynton
National Lamp Works Cleveland O
W R Collier
Georgia Railway and Power Co Atlanta Ga
J C McQuiston
Westinghouse Dept. of Publicity East Pittsburgh Pa
E W Rockafellow
Western Electric Co New York City
R R Young
Public Service Elec Co Newark N J

Respectfully submitted,

JOHN G LEARNED *Chairman*
E L CALLAHAN
E L FRANKLIN
F H GALE
S V WALTON

I move that the secretary cast one ballot.

(Motion seconded and carried)

CHAIRMAN JONES: The Secretary reports that he has cast the ballot as instructed. The officers are duly elected.

Before this meeting is turned back to Mr. Burnett, I want to say a word of appreciation of the work done by both Mr. Callahan and Mr. Burnett during the past year. Mr. Callahan was elected to the chairmanship of the Section at the close of my term a year ago, but owing to an understanding among the Executive Committee members and the instructions of the main body, a representative who is not a company employee, or an employee of a firm supplying electricity, is not eligible to the chairmanship of the Section. Mr. Callahan changed his business relations from a central station position to a manufacturing position which automatically terminated his duties as chairman. He therefore resigned, and in his place the Executive Committee appointed Mr. Burnett. Mr. Burnett has given a great deal of time and careful attention to this work, which has involved a great deal of detail. It is a poor recompense to any chairman to have the pleasure of presiding at Section meetings only. Most of you are familiar, I take it, with the detail to which the Executive Committee has to give attention during the year. I think it is no more than fitting that this body here assembled express to Mr. Callahan and Mr. Burnett unqualified approval of and thanks for their work during the past year.

(Motion made, seconded and carried)

CHAIRMAN JONES: I just want to say, in behalf of Mr. Becker, who is not here, that the fact of his nomination and election will come to him as a complete surprise. I begged him to come with me to this convention, but he has a rate case on his hands now that is taking up most of his time. As a past chairman, I will say to you what I know he would say, that the chairman of any Section does not know all of the men. He must appoint on his committees men whom he does not know. I am sure that if anyone here would like to serve on a committee of the Commercial Section, a note to Mr. Becker stating that fact and perhaps the committee preferred would be appreciated by him.

CHAIRMAN BURNETT: Is there any other unfinished business?

I would like to say, in closing this meeting, and the Section work for the Convention, that I have appreciated very much the opportunity you have given me to lead these meetings. I have taken great pleasure in the work of the year. I have here four typewritten pages of names of the men who have served as officers of the Section and as chairmen and members of the various committees. At no time, I believe, has the work of the Commercial Section been in better shape or elicited more interest. It has been improving in scope and increasing in importance ever since its organization. We are entering upon a new administration, and there is important work to be accomplished. There will probably be several additional questions to come before the Section next year which will require the appointment of other committees. I bespeak for the incoming administration the hearty support of all of the commercial men in the electric light industry.

I thank you for your attendance and your close attention. Unless there is some further business to come before the meeting, I will declare the meeting adjourned.

(Adjourned)

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World's Largest Turbine Placed in Commercial Service

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This machine is of 30,000 Kw. capacity. Its general design is similar to the 35,000 Kw. turbine at the Schenectady Works of the General Electric Company. In both machines a single generator is direct connected to, and mounted on the same bed plate with the turbine which drives it.

The completion of this contract marked a new epoch in the history of steam turbines. The installation is notable not only because the unit is so much larger than anything heretofore attempted, but because its design and manufacture were carried out without hitch or delay of any kind and the installation completed in less than a year from the date of awarding the contract. The machine was immediately placed in service and for the past four months has been carrying daily commercial load.

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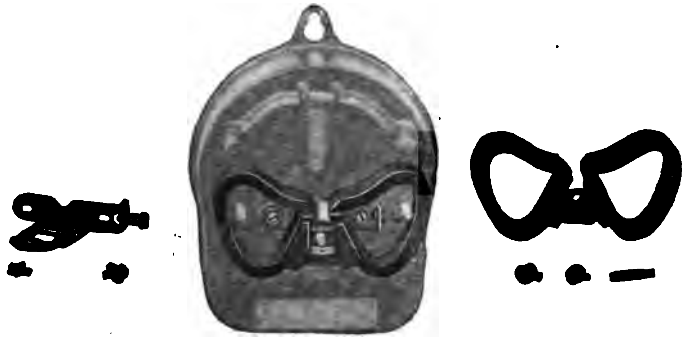

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The regulating or adjustment elements of a watthour meter control the speed of meter so that it will register the load correctly under widely varying load conditions.

The continued accuracy of a meter depends more upon the permanence of the damping magnet, than upon any other one thing. The two C-shaped magnets used in the Type I-14 Meter are manufactured from the highest grade of steel, specially hardened, magnetized and aged. The perfection of the processes by which these magnets are produced has been developed in the commercial production of ten million magnets. In ordinary service these magnets are absolutely permanent.

The full load speed of the meter is regulated by moving these magnets nearer to or further from, the edge of the moving disk, thus increasing or decreasing the magnetic drag. This adjustment is made by a micrometer screw, which gives a fine regulation with a wide range of adjustment.

The friction compensation or light load adjustment is regulated by the "light load plate" which carries a small copper punching under the potential pole. The plate is moved laterally by a micrometer screw to secure the desired compensation.

The permanence of magnets and the simplicity and convenience of adjustments are two of the many good points of Type I-14 Meters.

This is the sixth of a series of seven advertisements explaining the advantages of various points of construction of Type I-14 Meters. The last advertisement of this series will appear in October 9th issue of the Electrical World and in October 2nd issue of Electrical Review.

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Are described the many varieties of sales helps furnished to Edison agents. Here are found timely window display suggestions and material together with a complete list of all the new booklets, bulletins, blotters, folders, posters, carcards, novelties, post cards, lantern slides, posterette stamps, display racks, cut-outs, pennants, billboard posters, wall charts, lamp shades, decalcomania and muslin signs, lectures, newspaper cuts, electrotyped advertisements and other publicity material. A typical list of "live" material includes 77 different pieces. This list does not include newspaper electros of which about 70 different cuts are offered in the course of a year.

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In all its completeness, is available to central stations and lamp agents holding Edison contracts.

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OF GENERAL ELECTRIC COMPANY
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For all Services

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OF EVERY DESCRIPTION
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The Otis Variable Speed Alternating Current Traction Elevator Machine. A development that makes possible the use of a relatively high speed elevator in Alternating Current districts.

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Is it fully developed in your city? Are you getting the most out of the enormous current revenues that come with the use of electrical devices for transporting people vertically? Do you know what these devices are, how they operate, where they can be used?

The answers to these questions are contained in a series of booklets which will be sent you at request. Booklets that picture and explain the newer developments in elevators; why and where Escalators are employed; how Inclined Elevators save for the user and earn for you; in what way Incline Railways and Hoists can be useful to your community and to the manufacturer.

You should have these booklets for your salesmen and for your customers. To know the "Efficiency" results that such electrical transportation devices invariably produce is to realize the valuable market for Central Station power that is latent in the office, residential, mercantile and industrial buildings of your city.

We offer facts, figures and a thorough sales co-operation to help extend motor drive as applied to elevating apparatus in your community. The first step is to ask us for these facts — today.

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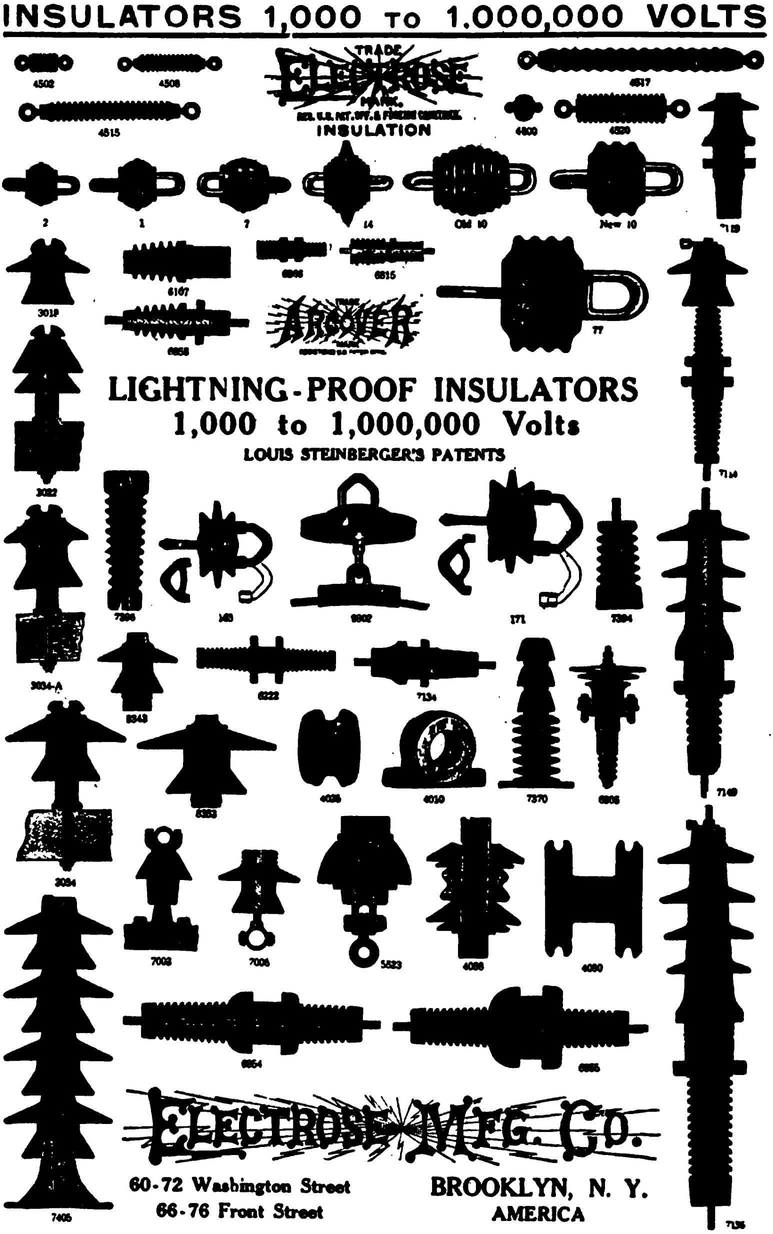

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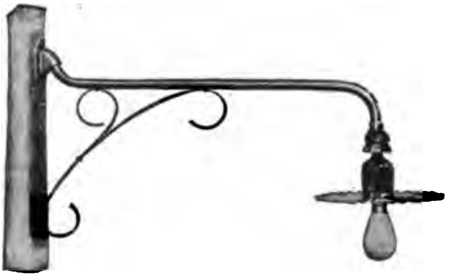

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- Neosho Electric Light Co.
- Niagara Lt., Heat & Pwr. Co.
- Ozark Power & Water Co.
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- Quapaw Gas Company
- Rio Grande Public Serv. Corp.
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